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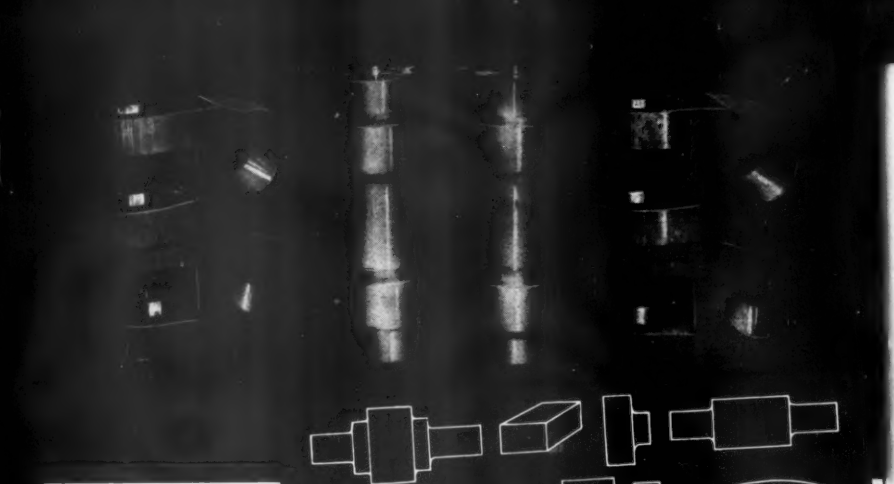

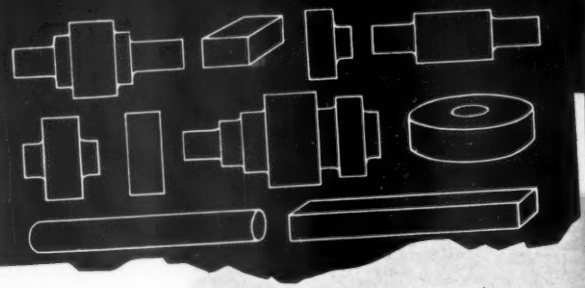

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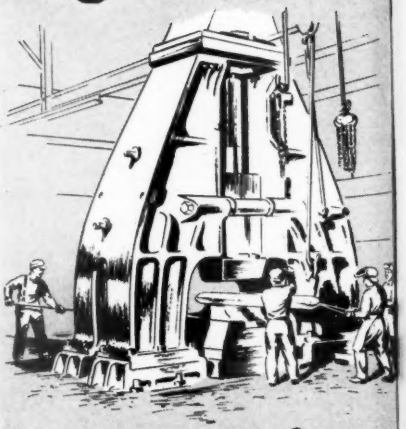

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The Tool & Die Journal is published monthly for those industry key men who are responsible for designing, building and using precision tooling.

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CHARLES H. HAYNES
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Vol. XI, No. 1 April, 1945

★

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PUBLICATION MEMBER

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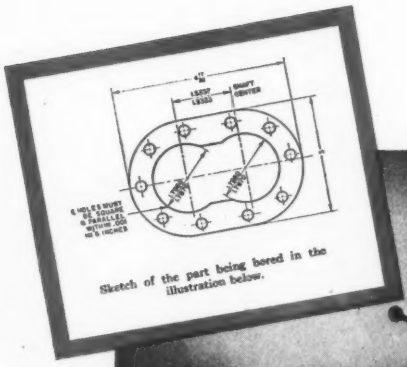
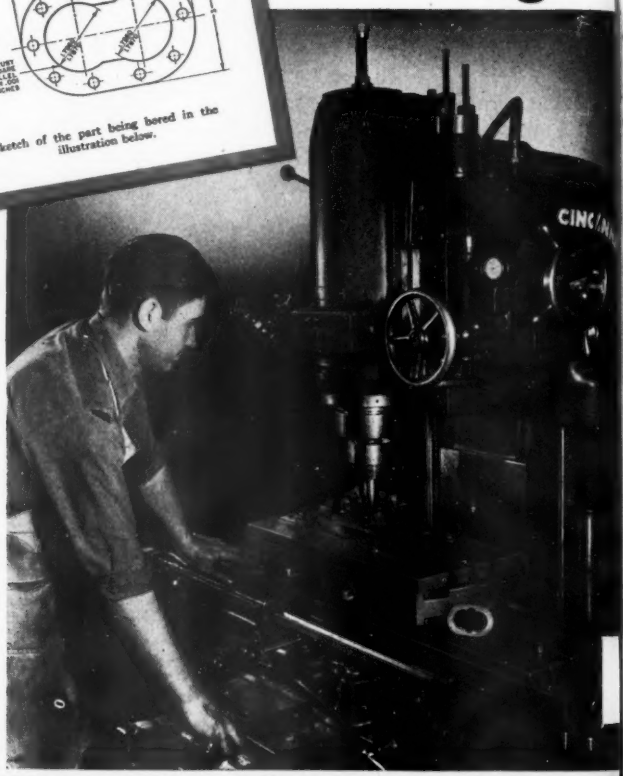


Sketch of the part being bored in the illustration below.



THE CINCINNATI MILLING MACHINE CO.

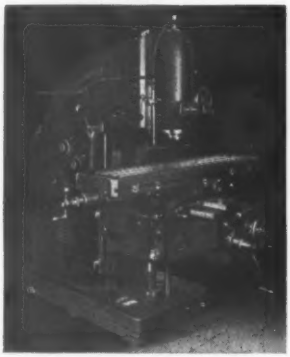
TOOL ROOM AND MANUFACTURING MILLING MACHINES . . SURFACE BROACHING MACHINES . . CUTTER SHARPENING

Production Attachment

Goes to Bat for Precision!

CINCINNATI

In the illustration on the opposite page, a CINCINNATI Vertical Dial Type Milling Machine, equipped with Power Feed to the Head, is rough and finish boring two $1^{25}/_{32}$" holes in a pump part, using a standard Index Base to obtain the desired precision. The work holding fixture is located so that the two holes to be bored are concentric with the center of the Index Base swivel. When the first hole is bored, the operator simply swivels and clamps the Index Base and bores the second hole. On this job accuracy was of paramount importance because the bore had to be square and parallel within .001" in 6" ¶ The above setup is rather unusual, but it emphasizes the versatility of the Dial Types. Perhaps it suggests ways in which the Dial Types and standard milling attachments could solve many of your machining problems.



Left: Rough and finish boring two holes in a pump part. Equipment includes 12" x 24" Index Base and Power Feed to the Head. The machine is a CINCINNATI No. 2 Vertical Dial Type Miller.

CINCINNATI *No. 3 Vertical Dial Type Milling Machine. Dial Types are available in Plain, Universal and Vertical styles, Nos. 2, 3 and 4 sizes, Medium and High Speed Ranges. Catalog M-970-2 contains complete information and specifications. Sweet's Catalog File for Mechanical Industries contains a brief description of these machines.*

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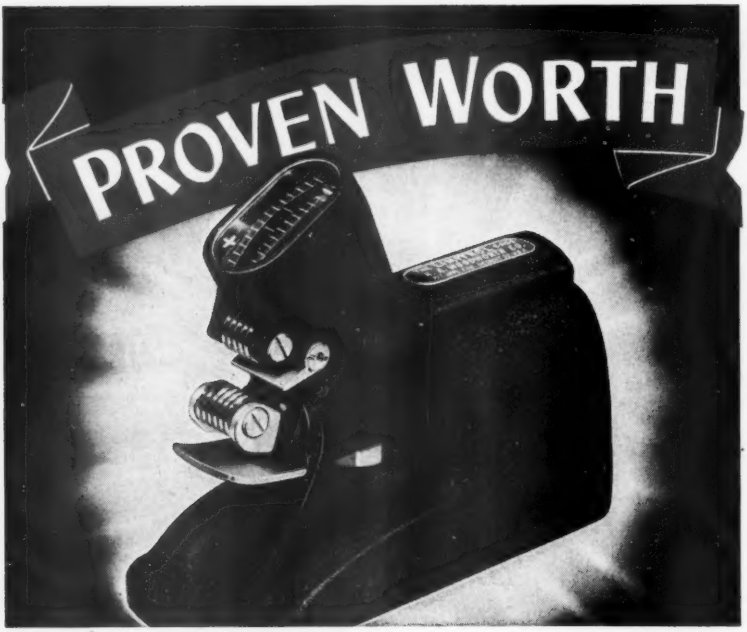

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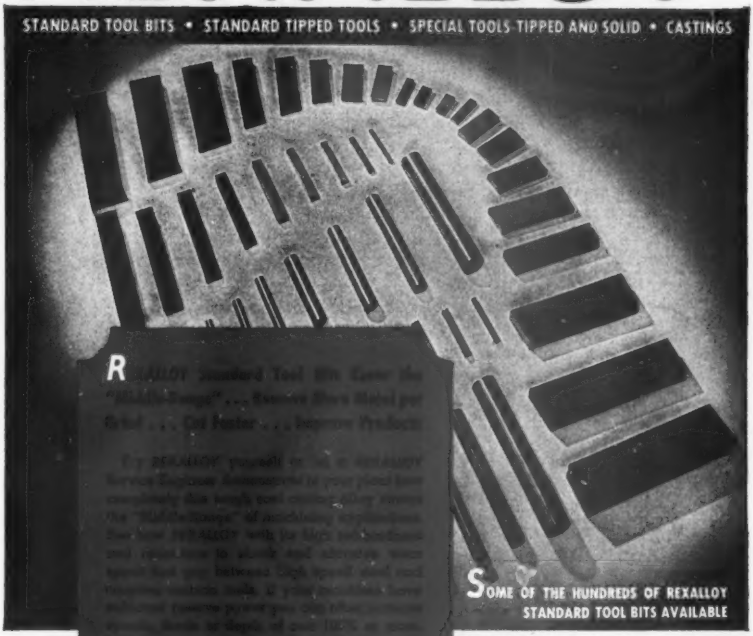

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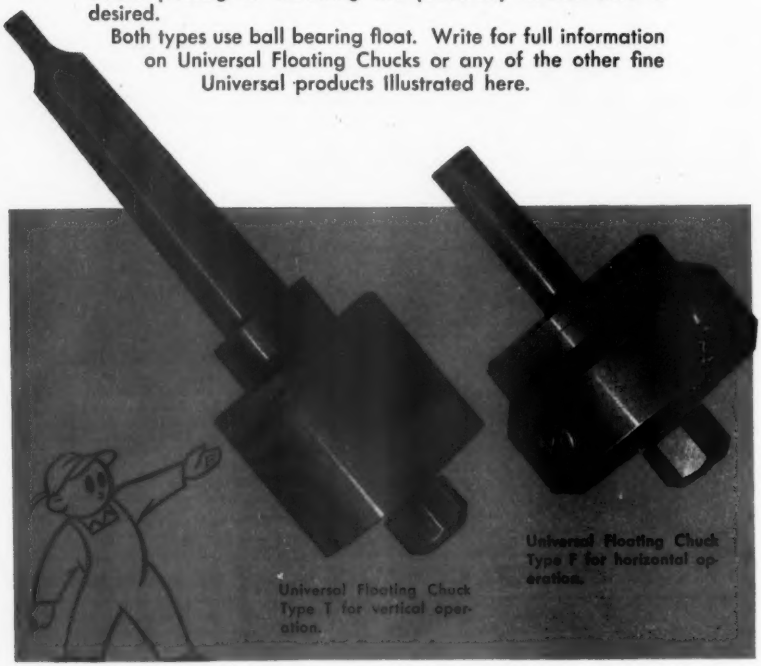
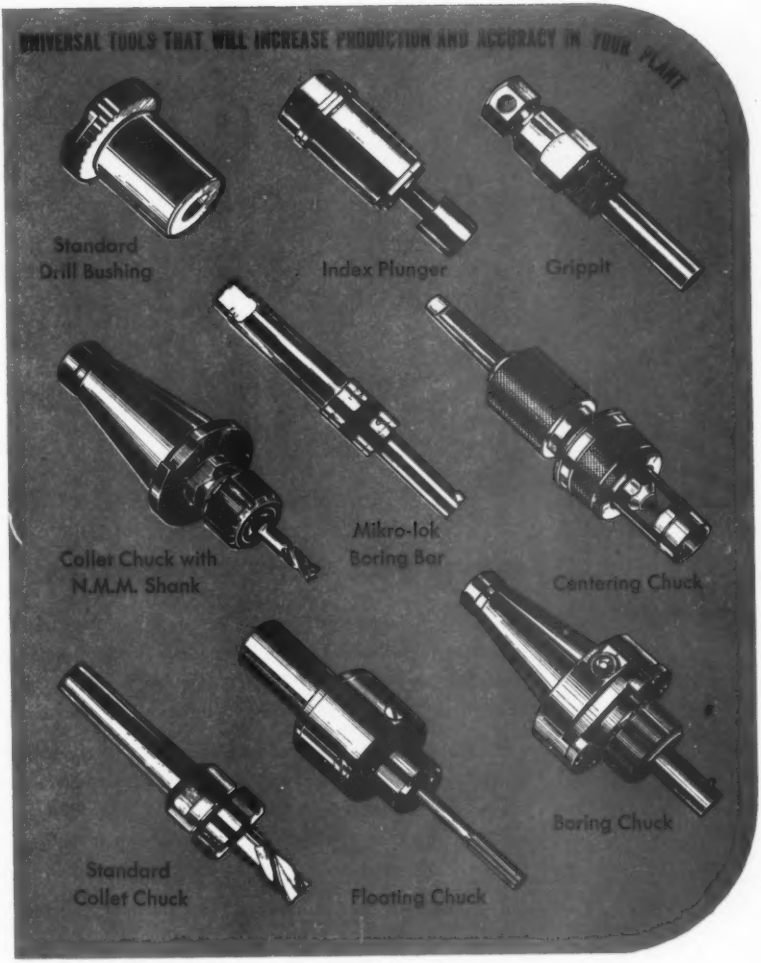


Universal Floating Chuck Type T for vertical operation.

Universal Floating Chuck Type F for horizontal operation.



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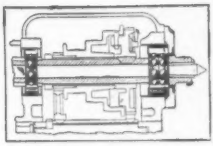

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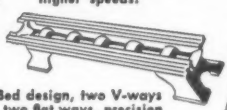

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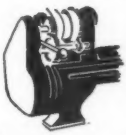

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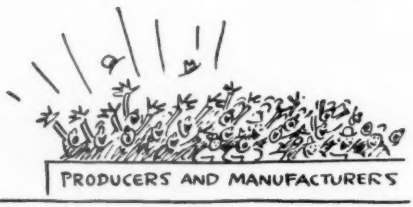

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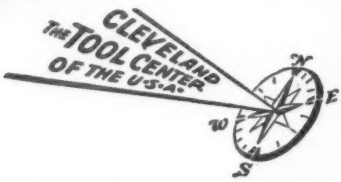

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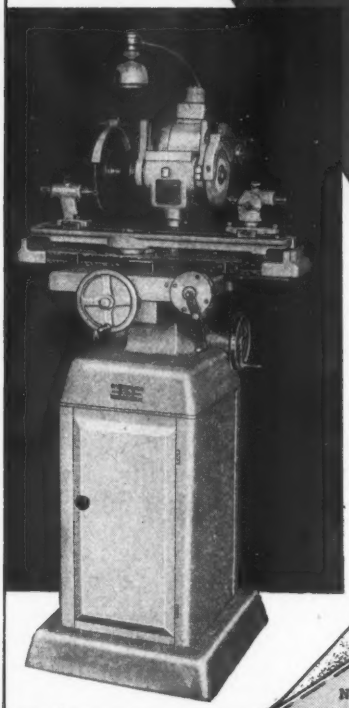

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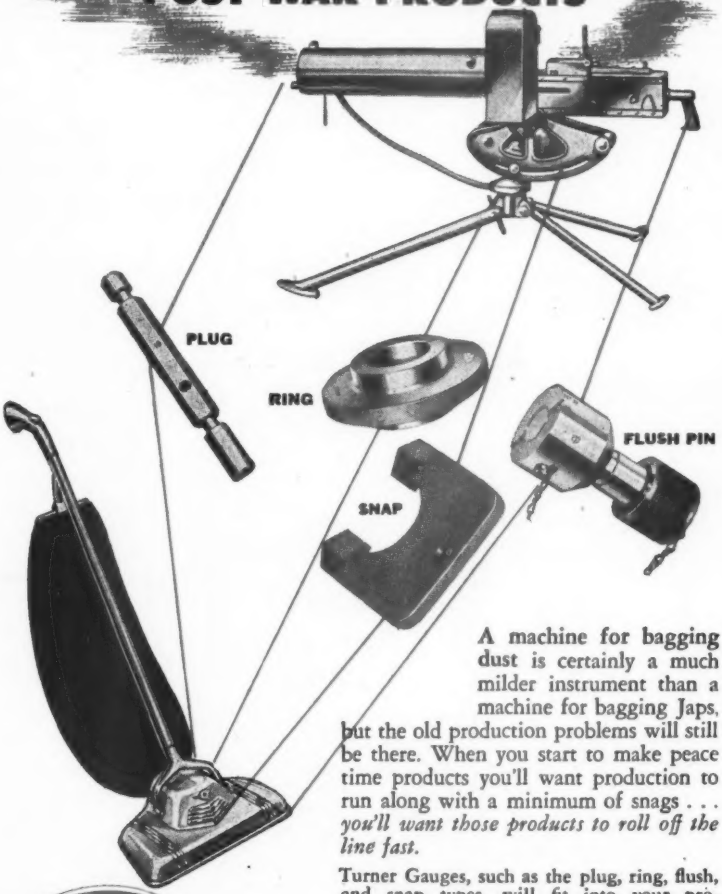

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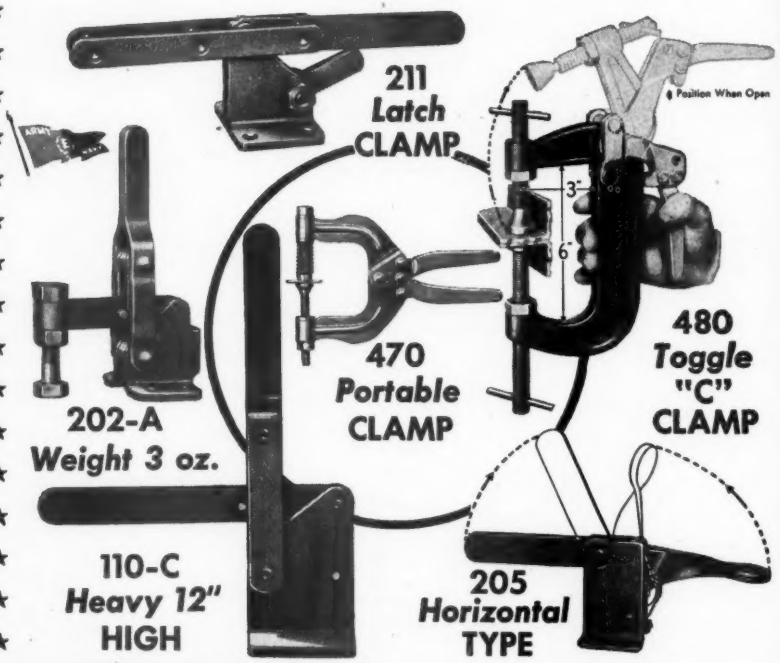

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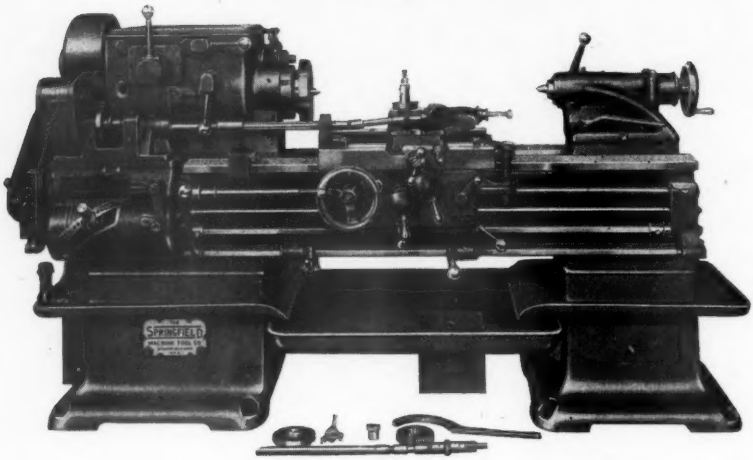

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Tailstock . . . all bearings and bed ways oiled from one well.

From headstock to tailstock—the SPRINGFIELD Lathe is *out in front!*

SEND TODAY FOR BULLETIN No. 163

Tells the why and how of Springfield's accurate production.

THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD • OHIO. U. S. A.

Immediate Delivery

ALL ELLSTROM
CHROMIUM PLATED
GAGE BLOCKS

★

You can now place your order for the famous Ellstrom Chromium Plated Gage Blocks and we can promise you *immediate delivery. All Ellstrom Gage Blocks are chromium plated* to give them very superior wearing qualities. It's the finest gage block that money can buy and solidly backed by a family tradition of fine gage making.

OFFERED INDIVIDUALLY OR IN COMPLETE SETS

in three classes: *WORKING* Sets with guaranteed tolerance of ±.000008″; *INSPECTION* Sets with guaranteed tolerance of ±.000004″ and *LABORATORY* Sets with guaranteed tolerance of ±.000002″.

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

Save these for work a machine can't do

HC-3 — ½ H. P. multi-speed counter shaft unit, 900 to 3600 R. P. M. Mounted bench-height on 3-leg caster base. 360° swivel

There was a time, not so many years ago, when the words "Made by Hand" were synonymous with highest quality. In some things this still holds true.

But it is equally true that many operations can be done better and faster, with a greater degree of efficiency, when a Haskins Flexible Shaft Machine is used. And this with much less strain and fatigue on the part of the operator.

Grinding—Sanding—Rotary filing—Wire brushing—Buffing and Polishing—all are machine operations. There are many more. Write for Catalog 45, showing many ways to save your hands and speed production with flexible shaft equipment.

R. G. HASKINS CO.
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FLEXIBLE SHAFT EQUIPMENT

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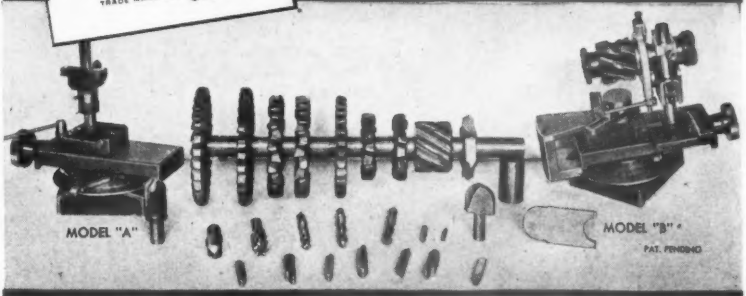
THE NEW APPROACH TO TOOL FORMING PROBLEMS



A GROUP OF STANDARD TOOLS WHICH HAVE BEEN MADE INTO SPECIALS ON THE RADIFORM

MEYERS RADIFORM WHEEL and TOOL FORMER makes it possible to form difficult tools, in your own shop, that are ordinarily very expensive and require weeks for delivery.

GET THE FACTS! Why waste precious time, money and materials needlessly?

Write, wire or call *TODAY* for complete literature and prices.

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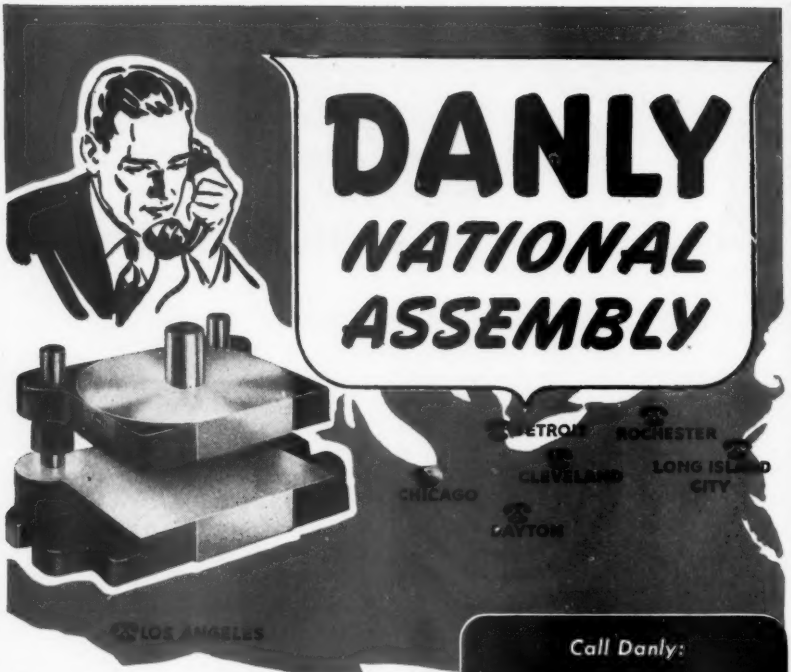

To Precision Standards

Precision finish of every part in Danly standard die sets makes possible Danly National Assembly. The resultant perfect fit saves you time and money through faster setups and longer, trouble-free operation.

Every Danly Die Set is individually assembled to your specification, through the Danly Plan of National Assembly to Precision Standards.

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It's simple arithmetic
DoALL GAGE BLOCKS
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ALL KINDS OF SPECIAL GAGES
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HEIGHT GAGE
LOCATING GAGE
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TOOL & DIE BUILDERS

SATISFYING those who are satisfied only by excellence . . . producing custom-designed tools for those whose discrimination is sharpened by the demands made upon them as Industrial Leaders in these critical days . . . Star Machine & Tool Company serves now as it has for three generations in the tool-making field.

This background of craftsmanship in designing made-to-order precision tools, which are the foundation upon which our American system of mass production is built, has helped us to fulfill demands made upon us by War Production . . . and will, soon, we trust, again be turned to the forming of the tools for Peace.

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. . . FOR YOUR PUNCH PRESS WITH THESE DICKERMAN FEEDS

These accurate, automatic feeds require no connection with the power shaft of your punch press. They save labor time and material waste, both for day-in-and-day-out production and on short runs.

The Dickerman Hitch Feed
1. Feeds from any position on any style die.
2. Saves time on both long and short runs.
3. Offers positive feed control, adjustable from 0" to its limit.

Made in two sizes, 2" and 4" Feeds
Send for booklet

The Dickerman Die Feed
1. Handles coiled stock up to ½" thick, widths up to 4".
2. Adjustable from 0" to its maximum feed length in increments of .001".
3. Fasten three screws — and it's mounted on your die set.

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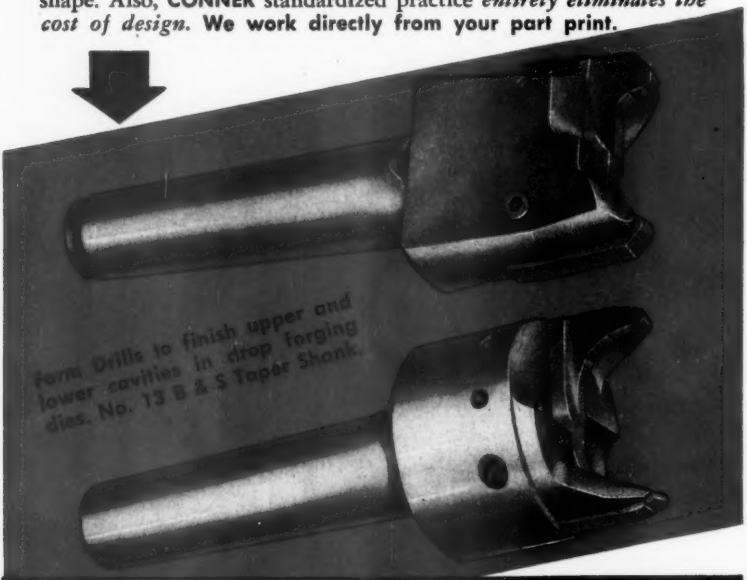
H. E. Dickerman Mfg. Co.
321TD ALBANY STREET SPRINGFIELD, MASS.

SAVE TIME • • •
by FORM DRILLING

Now- **FORM DRILLS DIRECT FROM YOUR PART PRINT!**

CONNER form drills enable you to drill holes with irregular contours, such as flat bottom holes — holes with one or more tapers on the side — one or more radii in the form, or any other irregular shape. Also, **CONNER** standardized practice *entirely eliminates the cost of design.* **We work directly from your part print.**



FOR DRILLING LARGE SIZE HOLES
Write for literature on **CONNER'S MULTI-TIP** drill equipment for form drilling—on **CONNER'S** special drilling applications—on **CONNER'S MULTI-TIP** drills for general use.

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DURABONDED

This New Mark Means

BETTER METAL SANDING

no added cost!

LONGER, COOLER CUTTING LIFE
From Coated Abrasives

More resistant to heat . Less sensitive to humidity

DURABONDED is the result of Behr-Manning's new process for hardening the adhesive bond, to resist cutting heat, retard loading, repel humidity. Actual field reports on metal sanding operations using DURABONDED abrasives show a 25% average increase in cutting life—at no added cost. Have one of our Field Engineers show you how DURABONDED can help on *your* production.

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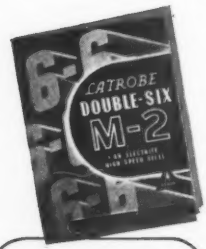
(DIVISION OF NORTON COMPANY)
RELIABLE COATED ABRASIVES SINCE 1872

BACK IN '38...
As long ago as 1938, to help conserve tungsten, Latrobe pioneered in the development of a tungsten molybdenum type high speed steel, known as DOUBLE SIX.
6-6

TODAY... **LATROBE**

DOUBLE-SIX

...meets M-2 specifications



Long before Hitler and his hordes over-ran the Low Countries, the war in China had cut off the supply of essential tungsten. That was back in '38, and Latrobe, realizing the urgent need for saving available tungsten, through painstaking research developed a new high speed steel, known as DOUBLE SIX.

Today, with only minor changes in its original analysis, DOUBLE SIX M-2 meets the automotive industry's specifications for molybdenum-tungsten high speed steels. Born of war-time necessity, Latrobe's DOUBLE SIX M-2 is assured a permanent place in the field of high speed steels, not only for the war emergency but for the peace-time needs to come.

Write for our latest bulletin on Double Six M-2

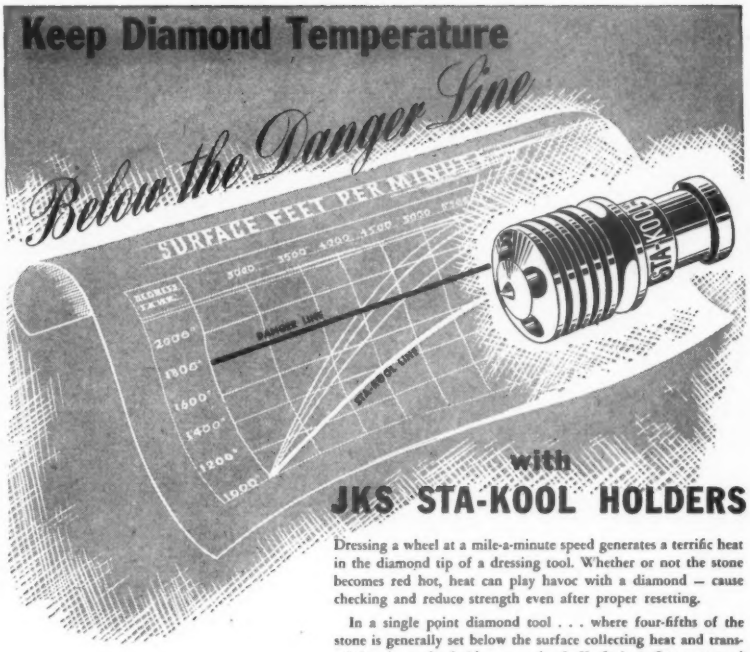
Latrobe **ELECTRIC STEEL COMPANY**

MAIN OFFICES and PLANT •• LATROBE • PENNSYLVANIA

HIGH SPEED STEELS · DIE STEELS · TOOL STEELS · STAINLESS · LATROBE RED ARROW for metal-cutting tools

Keep Diamond Temperature

Below the Danger Line



with JKS STA-KOOL HOLDERS

Dressing a wheel at a mile-a-minute speed generates a terrific heat in the diamond tip of a dressing tool. Whether or not the stone becomes red hot, heat can play havoc with a diamond — cause checking and reduce strength even after proper resetting.

In a single point diamond tool . . . where four-fifths of the stone is generally set below the surface collecting heat and transmitting it to the holder . . . the J. K. Smit & Sons patented STA-KOOL holder removes all possibility of damage from overheating. Its internal ducts and fins allow quantities of coolant to pass around, through and under the metal setting. Setting and enclosed portion of the diamond are efficiently cooled. Excess heat created in the diamond point has no chance to accumulate inside the tool, but instead is dissipated in the larger cooled portion of the stone and setting. With proper use of the correct size STA-KOOL tool for the job, temperatures never rise above the Danger Line. Specify STA-KOOL holders . . . available for all makes of machines.

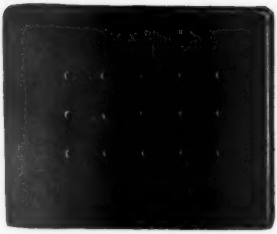
J. K. SMIT & SONS, Inc.

157 Chambers St., New York 7, N. Y. 6400 Fireman Ave., Detroit 4, Mich.

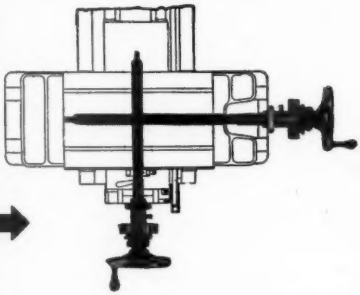
DIAMOND WHEELS • TOOLS FOR DRESSING WHEELS • CORE BITS • METAL WORKING TOOLS • POWDER

15 holes in 15 minutes

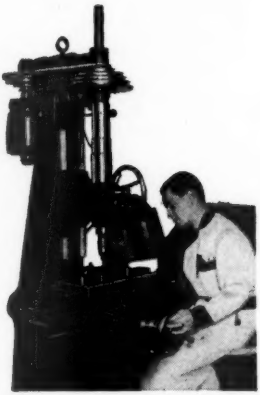
Spotted, Drilled and Reamed to ±.0002
by the
Coordinate Hole Location Method*



...because
Micrometer Lead Screws
Accurate to
.0002" in 16 inches



...Speed Table Settings
on the
MOORE JIG BORER



* One boring cut to increase accuracy to ±.0001" required only five minutes additional time for all fifteen holes. Write for descriptive literature.

MOORE TOOLS

MOORE JIG BORER

MOORE SPECIAL TOOL CO., INC., 726 Union Avenue, Bridgeport 7, Conn.

Need specially shaped Carboloy Blanks?

Modern Carboloy-developed forming technique permits fast, accurate, economical shaping of blanks to exact specifications in practically any shape or size.

You receive blanks ready for brazing to your tool or part, with just a few thousandths of stock removal necessary when grinding. Particularly advantageous for maximum economy on carbide form tools made in your own tool room. This special blank service is also available to users employing carbide on gages, shop-parts such as work rests, cams, guides, etc., ordinarily subject to rapid wear, and product parts requiring "wear-proofing" at points of excessive abrasion.

SPECIALLY SHAPED CARBOLOY BLANKS

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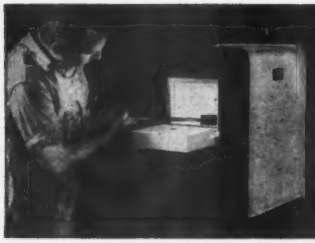


Heat Treat Your Own Small Parts...

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
2. Saves time and expense of drawing or tempering small metal parts in large furnaces.
3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
5. Eliminates shut downs and delays in servicing emergency repair orders.

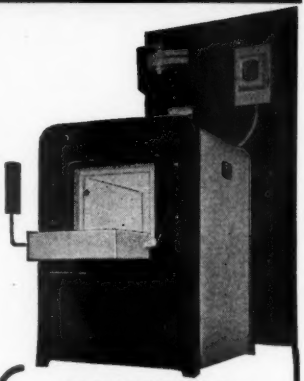
AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8″W 6″H 14″L	29.6	3400	14.8	$124.00*
MH-4	10″W 6″H 18″L	....	4800	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$152.40.



REPLACEABLE HEATING ELEMENTS

Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel — furnace structure remains undisturbed.

FREE—Complete data covering specifications, additional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.

COOLEY ELECTRIC MANUFACTURING CORP.
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important
news for
tap users!
Example:
1/2 - 13 Tap—4 Flutes
Magnified 3 Times
.002" Relief
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Concentric
SOSSNER'S form-relief taps
give maximum
free cutting
• less friction from land
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All Sossner taps are ground from the hardened solid high speed steel blank. Standards and specials made to your specifications.
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TYPICAL JOBS

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping —and gave a straighter hole.

Aircraft Instrument Panel Control Wire Bushing. Hole .187" diameter —held to .0002", stock removal .001", sixty per hour.

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

Aircraft Carburetor Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Carburetor Idler Valve Jet. Hole is honed after reaming for smooth action.

Aluminum Aircraft Link produces high finish without bell-mouthing.

For Today's War Production-

for Tomorrow's New Products

The Sunnen Precision Honing Machine will quickly hone and finish to an accuracy of .0001" or better, produces a super-smooth finish of 2 to 3 micro-inches.

Hones and finishes internal cylindrical surfaces from .185" to 2.625" in diameter—with a guaranteed accuracy of .0001"—can be used in any metal or plastic, except lead or babbitt—no jigs or fixtures needed—requires no skilled labor—can be set up to operate in one minute—is economical to operate.

Get complete information on the Sunnen Precision Honing Machine. A Sunnen engineer will be glad to call on you—or write for free descriptive bulletin.

SUNNEN PRODUCTS COMPANY
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SUNNEN HONING

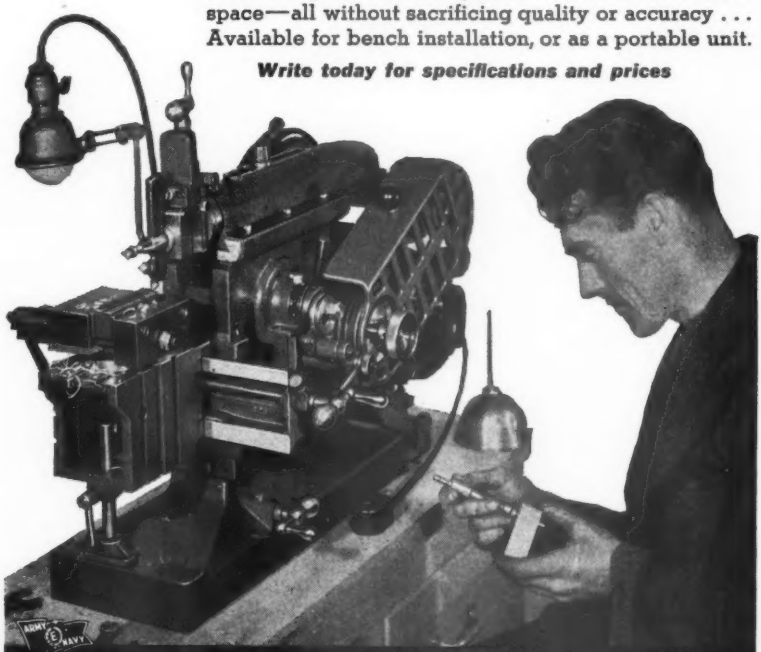
Speed • Accuracy • Finish

AMMCO 7″ SHAPER

A precision machine for precision work . . .

Phenomenal performance of this precision shaper in war production work is an indication of its great value in the postwar period when your competitive conditions put added importance on accuracy and low-cost production . . . The precise accuracy of work turned out on an Ammco 7″ Shaper assures precision production unsurpassed by larger machines selling for hundreds of dollars more than the Ammco . . . In addition to low initial cost, you also effect big savings in time and expense on set-up operations . . . You save on electrical power consumption . . . You save on floor space—all without sacrificing quality or accuracy . . . Available for bench installation, or as a portable unit.

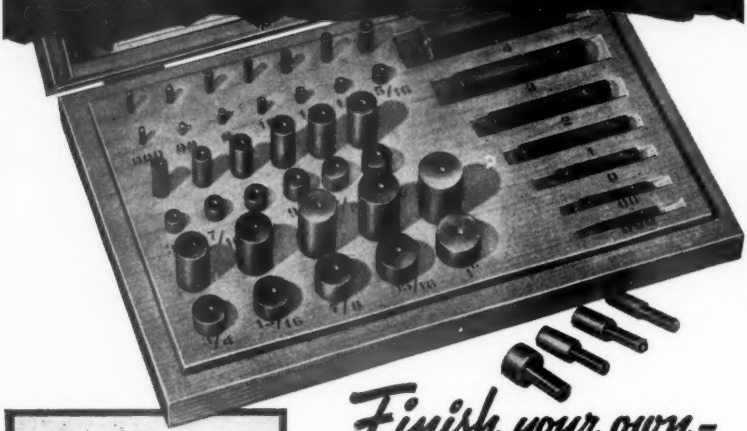
Write today for specifications and prices



AMMCO

2100 COMMONWEALTH AVENUE
NORTH CHICAGO, ILLINOIS

Don't wait for special plug gages!



Finish your own—

FROM THIS SET OF

SCHERR PLUG GAGE BLANKS

Here is a new idea, which has been received with enthusiasm wherever offered. It eliminates delay in starting production on a hole job, while waiting for delivery of the necessary plug gages.

Any shop with a good toolroom or cylindrical grinder can finish these blanks to specified size. The set includes blanks for finished sizes from .029" to 1.010". The blanks are complete and finished in every respect except for final grinding. Both centers are lapped for accurate centering, and all that is needed is a few minutes between centers on a cylindrical grinder, with lapping in addition if finer than commercial finish is required. There are 36 blanks in the set and 7 hexagon handles.

Price for the complete set, $49.50. Individual gage blanks available from .059" to 1.510". Write for details and quotation.

GAGEMAKERS
BIG SAVINGS FOR YOU! In making up gages to your customer's orders, why not buy the blanks from us? You save time, trouble, money. Ask us for quantity quotation.

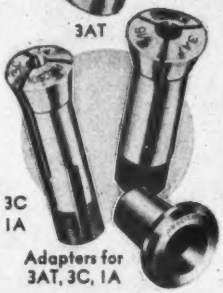
GEO. SCHERR CO., Inc. 200-B LAFAYETTE STREET NEW YORK 12, N. Y.

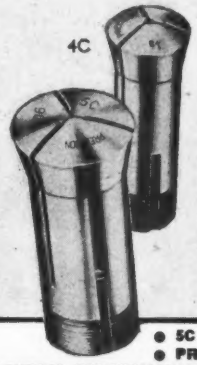
WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

For 10" ATLAS & LOGAN, SOUTH BEND, SHELDON, CRAFTSMAN, POWR-KRAFT, CLAUSING and other important lathes.

IMMEDIATE DELIVERY FROM STOCK

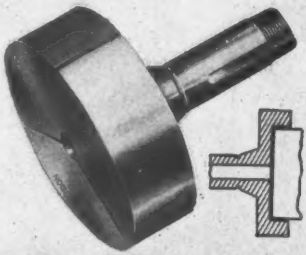




The *Precision* name on a collet is your unconditional guarantee of accuracy in machining, hardening and grinding. Make sure then to specify *Precision* when ordering from your dealer. Literature on request.

- MODEL 3AT: For 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft.
- MODEL 3C: For 8" & 9" South Bend, Clausing, Hardinge No. 3, 10" LeBlond, etc.
- MODEL 1A: For 8" & 9" South Bend.
- MODEL 5C: For 9", 10", 16", 18" South Bend, 1" capacity Sheldon, Schauer, Sebastian, etc.
- MODEL 4C: For 14½" South Bend, ¾" capacity Sheldon, Hardinge No. 4, Elgin, etc.
- MODEL 480: For Logan Screw Machine, Turret Lathe and attachments; Warner & Swasey No. 1, etc.
- BREN Collet: For Handwheel & Lever-Type Speedichuk.

KLUTCH - KOLLET (Step Chuck) for chucking work to 2¾" diameter with collet accuracy. Head unhardened for easy boring. Fits 3AT, 3C, 1A adapters only. List unbored $7.50 each.



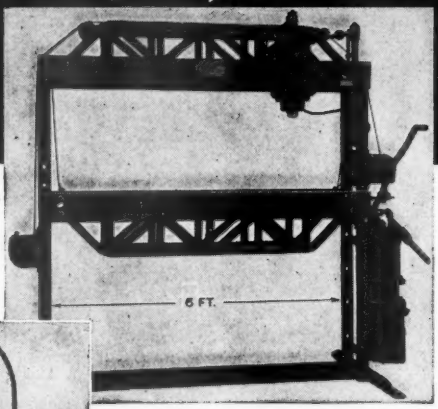
- **5C KLUTCH-KOLLET NOW READY. List Unbored $10.50.**
- **PRECISION Collets also available in Hexagon and square holes.**

GENERAL DIE-STAMPING-TOOL COMPANY 262 MOTT STREET, NEW YORK 12, N. Y.

"They can do everything but cook"

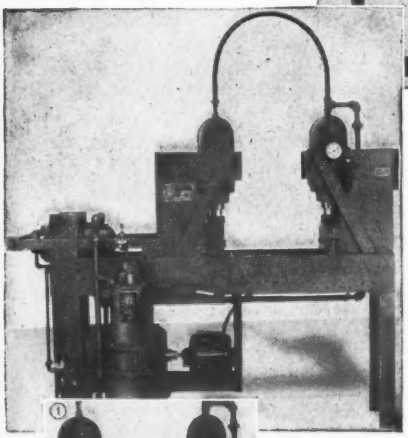
THAT'S THE WAY ONE PRODUCTION MAN EXPRESSES HIS OPINION OF

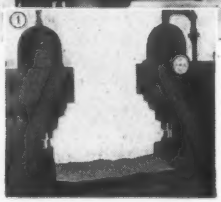
KRW HYDRAULIC PRESSES



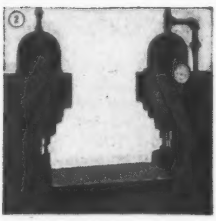
Adopted as a SHEET METAL STRAIGHTENER. This unit consists of three heads on a special frame. The two upright heads grip the metal sheet. The horizontal head quickly removes kinks by stretching. This unit combines Hand, Air and Electric-Oil operation. (Any one can be used independently).

This special adaptation was built to STRAIGHTEN ARMOR PLATE. The entire ram head mechanism slides the full width of the head frame so ram can be positioned over a "high spot" on the plate. Distance between uprights, 6 feet. Air-Oil and Hand operated.





Illus. No. 1 shows "kinked" sheet metal as it comes from the rollers, gripped by the two vertical heads. Illus. No. 2 shows the sheet after being "stretched" flat by pulling pressure of the horizontal head.



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● **Standard KRW Hydraulic Arbor Presses are made in 25, 50, 60 and 75-ton capacities and provide the utmost in speed, efficiency and versatility. For unusual applications, special presses—at slight additional cost—can be engineered to exactly fit any special problem. Any KRW Press can be equipped for Hand, Air-Oil or Electric-Oil operation. Many special presses combine these methods of operation in order to provide greater efficiency.**

Bring your Hydraulic Press problems to KRW. In more than one instance we have been able to design, build and ship a specially-designed press in a matter of weeks that did the job better, faster and cheaper than costly, hard-to-get equipment. Write for descriptive Press Bulletin. K. R. Wilson, Dept. 18 215 Main St., Buffalo 3, N. Y.

K. R. WILSON

BUFFALO 3, NEW YORK

A ONE MACHINE TOOLROOM WITH GUARANTEED PRECISION

RIVETT

The Rivett No. 608 is a super-precision, back-geared screw-cutting bench lathe designed for fine manufacturing, repair and experimental work. In tool-making and instrument shops it will handle a great variety of parts within the closest precision limits.

Finely made attachments for milling, spiral cutting, slotting, relieving, taper turning, ball turning, grinding, forming and multiple operations enable the user of a fully equipped No. 608 to finish his work completely without recourse to other machines, and throughout his entire series of operations to utilize the inherent precision of the lathe itself.

Write for Bulletin 608

Guarantee

The Rivett 608 will turn or bore within 0.0001" in six inches—work held in collet, and turn between centers within 0.0001" in six inches. The Rivett 608 will face to eight inches diameter within limit of 0.0002" concave, 0.0000" convex. The Rivett 608 will cut threads within 0.0005" in twelve inches, or within 0.0003" in any three inches, or within 0.0002" in any inch of a specimen piece.

RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS., U.S.A.

PRECISION IS *Built In* IN SOUTH BEND LATHES

Testing Saddle Cross Slide

Testing Hardness of a Headstock Spindle Bearing Surface

Testing a Lead Screw

The "built-in" precision of South Bend Lathes, so evident in their performance, has its source not only in their design features, but in every vital part. Each part has behind it the experience of thirty-eight years of lathe building, plus constant research directed towards its improvement. Backing this up in every manufacturing process are rigid controls that prevent deviations from established standards. These are a few of the reasons why South Bend Lathes are better today in every way.

This "built-in" precision makes possible heavier cuts and feeds, easier operation, longer life, and greater accuracy. It pays dividends to the users of these lathes in better and faster machining. Examine your metal working requirements in view of the advantages that can be obtained through the use of South Bend Lathes. Write for new, full color catalog, No. 100-D.

SOUTH BEND LATHE WORKS

432 E. MADISON ST., SOUTH BEND 22, IND. • *LATHE BUILDERS FOR 38 YEARS*

How consistent testing saves you trouble

BY subjecting every product to a series of tests before it leaves its factory, "CARBORUNDUM" saves industry an untold amount of grief. Uniformity of the abrasive means uniform wheel performance. Absence of flaws reduces down time in your shop. And these checks assure you that each product by "CARBORUNDUM" is the type of dependable abrasive tool you need for your job.

But there is still more involved in the production of good grinding wheels, coated abrasives and special products. It is equally important to get the particular abrasive combination best suited to the job. Your "CARBORUNDUM" Representative is the man to help you do that. And his efforts are supplemented by the knowledge of the "CARBORUNDUM" Abrasive Engineers. These are the men who have helped perfect a large share of the abrasive processes which have become standard. The Carborundum Company, Niagara Falls, New York.

THERE IS A PRODUCT BY

CARBORUNDUM

TRADE MARK

FOR EVERY ABRASIVE APPLICATION

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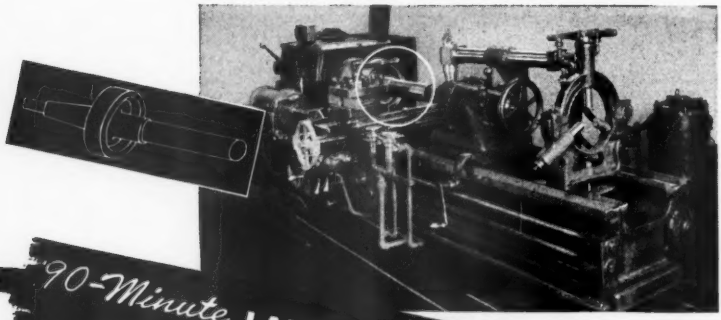


90-Minute LATHE JOB
DONE IN 10 Minutes WITH A TURCHAN!

. . . WITHOUT CHANGING TOOLS

How the Turchan Attachment simplifies difficult lathe work, making it possible to reduce machine time to a fraction of that required by former methods, is clearly shown by the example here illustrated—a 14″ diameter aircraft engine drive shaft requiring the facing of a curved recess 1¼″ in depth.

The method previously followed involved the use of 4 forming tools, whereas by the Turchan method of duplicating the curved recess by means of a simple template, a single turning tool does the job. Because of the faster feed rate thus made possible, and the elimination of all tool changes, the job is now completed in 10 minutes instead of 90 minutes as formerly required.

"Turn to Turchan"

Equally amazing are the savings in machine time and production costs when the Turchan Attachment is used on milling machines, planers, grinders, shapers or boring mills. You can easily prove it to your own satisfaction by sending us a sample or blueprint of any irregular or eccentric shaped part and comparing our estimates with your own figures as to machine time and production costs. No obligation.

SEND US

Sample or Blueprint of Parts for Turchan Production Estimate

TURCHAN FOLLOWER MACHINE CO.
8257 Livernois - Detroit 4, Mich.

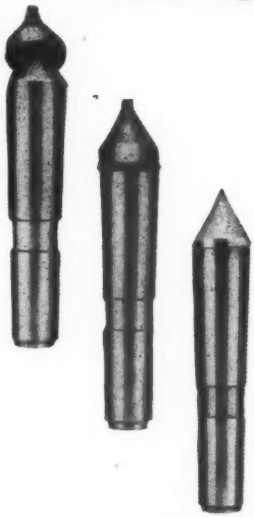
TURCHAN
Hydraulic Follower Machine

YOUR WORN TOOL STEEL CENTERS

Can be Salvaged by using

COLMONOY

TIPPING SERVICE



● New tip castings of Colmonoy No. 6 can now be applied to your centers by using Silver Solder or a low temperature brazing alloy. Will outlast and outwear new, untipped centers.

We will apply for you, or furnish tips only. Moderate prices. Write for Bulletin CT-1 for complete information.

OFFICES

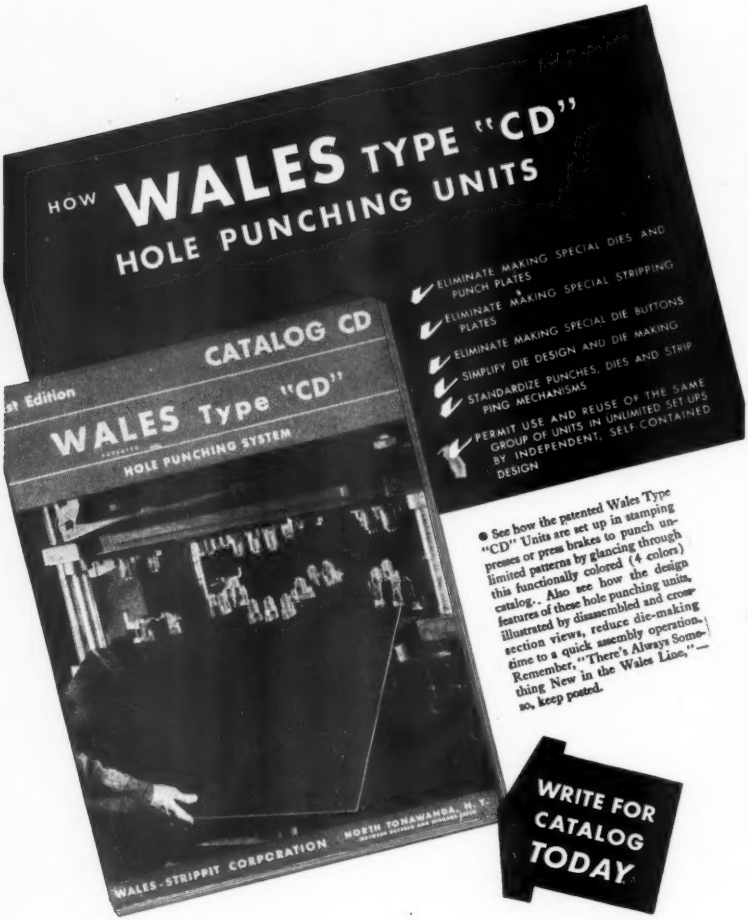
Detroit, New York, Blasdell, N. Y., Chicago, Tulsa, Los Angeles, San Francisco and in Canada.

WRITE FOR LITERATURE

In addition to Bulletin CT-1, mentioned above, we shall be glad to send you our General Catalog No. 75, covering the complete line of Colmonoy Hard Facing Alloys, and illustrating typical applications.

WALL-COLMONOY CORP.

720 Fisher Bldg., Detroit 2, Michigan


HOW WALES TYPE "CD"
HOLE PUNCHING UNITS
ELIMINATE MAKING SPECIAL DIES AND PUNCH PLATES
ELIMINATE MAKING SPECIAL STRIPPING PLATES
ELIMINATE MAKING SPECIAL DIE BUTTONS
SIMPLIFY DIE DESIGN AND DIE MAKING
STANDARDIZE PUNCHES, DIES AND STRIPPING MECHANISMS
PERMIT USE AND REUSE OF THE SAME GROUP OF UNITS IN UNLIMITED SET-UPS BY INDEPENDENT, SELF-CONTAINED DESIGN
CATALOG CD
WALES Type "CD"
HOLE PUNCHING SYSTEM
WALES-STRIPPIT CORPORATION
NORTH TONAWANDA, N. Y.
See how the patented Wales Type "CD" Units are set up in stamping presses or press brakes to punch unlimited patterns by glancing through this functionally colored (4 colors) catalog. Also see how the design features of these hole punching units, illustrated by disassembled and cross-section views, reduce die-making time to a quick assembly operation. Remember, "There's Always Something New in the Wales Line,"—so, keep posted.
WRITE FOR CATALOG TODAY

WALES-STRIPPIT CORPORATION

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(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President

Specialists in Punching and Notching Equipment

CHECK ANOTHER SUPER "FIRST"

NOW... Solid Tungsten Carbide Reamers Available from Stock!

Good news for users of small reamers! Super Tool Company now stocks solid tungsten carbide reamers in sizes down to .125". Now you can order these small size reamers and get quick deliveries without the delays that resulted when they had to be manufactured on special order.

And here is more good news! Because of Super Tool's advanced manufacturing techniques these small solid tungsten carbide reamers now can be furnished on special orders in sizes as small as .09375".

Next time you need small size reamers, specify SUPER . . . and get the better performance, the cleaner cuts, the precision work and the greater production economies that Tungsten Carbide can bring to your cutting jobs.

Write TODAY for complete data and prices on Super Standard Solid Tungsten Carbide Reamers.

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With LIMA GEARSHIFT DRIVES

Capacities ½ To 20 hp

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REPRESENTATION IN MOST PRINCIPAL CITIES

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SHORT-CUT to IRREGULAR SHAPES

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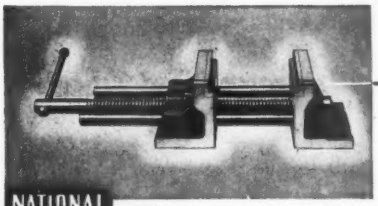
HEAVY DUTY HANDNIB

A combination Nibbling, Shearing, Rod Cutting and Punching machine . . . mounted on a swivel base . . . a *real short-cut to irregular shapes.* Ideal for cutting templates, trial blanks and experimental work' *better* and *in one-tenth the usual time* required. Capacity: Nibbling and Shearing 3/16" flat stock . . . Punching Holes up to ½" in ⅛" sheets . . . Rod Cutting 3/16", ¼", 5/16" and ⅜" round bars.



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A HANDY DRILL PRESS VISE

Built-in Parallels
No interference from chips or burrs
Use it on three sides
Special V-Groove for round shafts
Through Drilling without damage to the vise.

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THE NATIONAL MACHINE TOOL CO.

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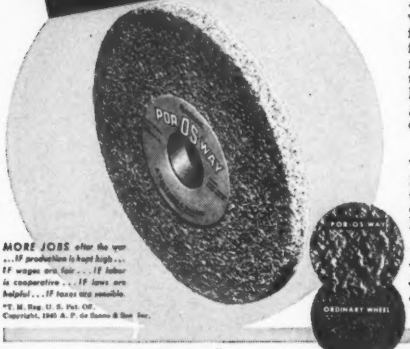
GRIND CARBIDE-TIPPED TOOLS AND DIES BETTER!

You can now get a better edge on carbide-tipped tools and dies—and no burns or discoloration. Grind them with the Por-os-way wheel with green silicon carbide. Back from the war, this remarkable ingredient does the trick in this *toughest* of Por-os-way wheels.

2 TO 5 TIMES
LOWER GRINDING COSTS



MORE JOBS after the war ... IF production is kept high ... IF wages are fair ... IF labor is cooperative ... IF laws are helpful ... IF taxes are sensible.

*T. M. Reg. U. S. Pat. Off.
Copyright, 1945, A. P. de Sanno & Son Inc.

IF there's such a thing as machinists' paradise, your men will be in it when they work with Por-os-way Grinding Wheels. Take it from users who've lived with this wheel for four tough years. They found it cuts hardest metals deeper, faster and cleaner. They learned that *open structure* Por-os-way works cooler, lasts longer and saves time on both rough grinding and precision finishing. They cut down rejects, boosted war production.

And in the peacetime of the future, Por-os-way will cut grinding costs way below competition. Make us *prove* what Por-os-way can do. Call in a Por-os-way engineer. A. P. de Sanno & Son, Inc., 464 Wheatland Street, Phoenixville, Pa., Since 1893.

← LOOK AT THE DIFFERENCE!

Your eye tells you at a glance why Por-os-way is *different*. See the *extra porosity* that gives you over 8 distinct operating advantages!

RADIAC*

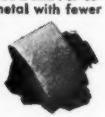
POR-OS-WAY*

The Precision Grinding Wheel

THE WHEEL THAT COSTS THE MOST AT FIRST ... COSTS THE LEAST AT LAST

SKY'S THE LIMIT WITH POR-OS-WAY SEGMENTS

Find a surface grinding record and you'll find Por-os-way segments. They hog off more metal with fewer passes at higher speed. Por-os-way cuts deep, doesn't "scrape" the surface ... makes no moan, no groan, no grunt. Less time out for dressing, too. Give your surface grinding wings, yet hold costs down to ground level ... with Por-os-way!



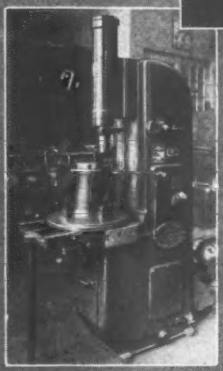
Put this

"JACK-OF-ALL-TRADES" on your production line!

Standard American Hydraulic Press does many types of jobs!

A standard machine capable of performing a variety of different operations is the V-1-½ 4-ton *American* Hydraulic Press. It can handle innumerable tooling adaptations for use on a wide variety of parts. Reconversion is no problem with versatile equipment of this kind.

Let *American* engineers show you how standard *American* equipment can serve you in war production today, yet be easily converted to perform your peacetime manufacturing operations. There is no obligation. Write today for further details.



The flexibility of the standard V-1-½ machine is graphically illustrated in the accompanying photographs. The upper picture shows the set-up for broaching a dovetail slot in rifle sights. High rate of production is maintained with ease of handling. The illustration at left shows the same machine tooled for assembling studs in an aircraft gear housing. This set-up features automatic indexing and locating of the part for pressing home the studs.

Protect your broaching tools when not in use. Tools last longer and give more satisfactory service if this precaution is taken.

MEMBER BROACHING TOOL INSTITUTE

American BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

BROACHING MACHINES
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SPECIAL MACHINERY

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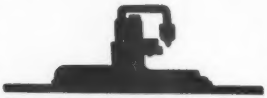
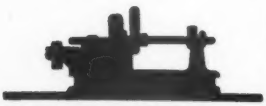
SET YOUR MACHINES LEVEL WITH Empco JACKS



Saves set up and re-leveling time

Self aligning on uneven floors



Accurate two-way adjustment

Machine Tool Manufacturers strongly emphasize the need, not only to set machines level, but to KEEP 'EM THAT WAY. Periodic re-leveling is essential for accurate work tolerances. How often, depends on the type of foundation. No method of machine setting is stable enough to maintain the accuracy of initial leveling. It is important to check after first month of operation, then check periodically and re-level whenever necessary.

When a machine is set on EMPCO JACKS the whole operation is the work of only a moment: Simply apply a wrench to the "hex" screw head, turn right to lift or left to lower until your level indicator reads "zero".

Write for descriptive folder. Prompt delivery.

SIZES AVAILABLE
No. 1...2 " normal height
No. 2...2⅜" normal height
No. 3...3¾" normal height

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THE ENTERPRISE MACHINE PARTS CORPORATION
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HELLER NUCUT

BLACK AND WHITE

EBONITED FILE

full details to be announced soon

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America's Oldest File Manufacturers - Good Tools Since 1836

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Let the Pioneers of
TOOL and DIE
WELDING ELECTRODES
Help You Effect Savings in Your Plant!

You can save many man hours, conserve material and minimize production delays. Tool steel welding can be used profitably in any plant using tools and dies. Here's how it can be done:

1 ***REPAIRING DIES*** . . . Existing units that may fail in operation can be welded, either partially or wholly, resulting in a minimum of "down-time".

2 ***COMPOSITE FABRICATING*** . . . Die units can be compositely fabricated, when practical, by welding, resulting in numerous advantages.

3 ***CORRECTING DESIGN*** . . . Welding facilitates making changes in contour, corners or edges during die "try out" or "change over" periods.

4 ***RECTIFYING ERRORS*** . . . Welding permits the correction of errors made in tool and die manufacturing resulting in great savings.

For complete information write for technical catalog

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Welding Equipment & Supply Co.

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

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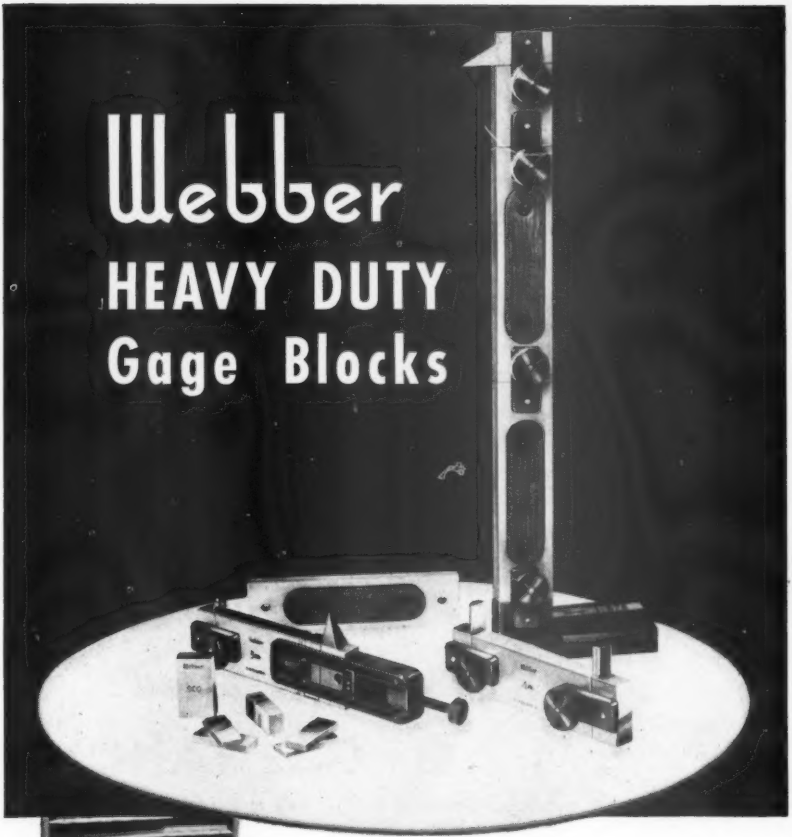
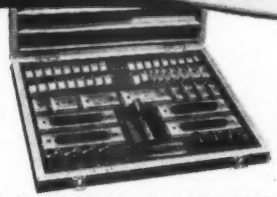
Webber
HEAVY DUTY Gage Blocks





Set No. H. D. 24—Range from .300 to 24.000 in steps of .0001" $385.00

Set No. H. D. 36—Range from .300 to 36.000 in steps of .0001" $450.00

WEBBER GAGE CO.

12903 TRISKETT ROAD
CLEVELAND 11, OHIO

The above shows the assembly of WEBBER HEAVY DUTY gage blocks into practical, accurate measuring tools. Webber Heavy Duty gage blocks are not only a set of precision standards but are quickly assembled into a precision HEIGHT GAGE . . . . an inside or outside CALIPER or a DIVIDER, which brings to the tool maker a new precision in layout and inspection work. These extra large . . . man size gage blocks have such generous wearing surfaces that lasting accuracy is assured. It takes only a matter of seconds to assemble these tools ready for use. Think of your satisfaction . . . measuring tools in a range from .300 to 24.000 or 36.000 and by the addition of extra 6.000" blocks, the possible extension of these features up to 100 inches or more . . . all within accuracies of millionths of an inch. The 6.000" blocks are fitted with inserted walnut insulation strips . . . thus when handling, heat from the hands is kept from the gage itself.

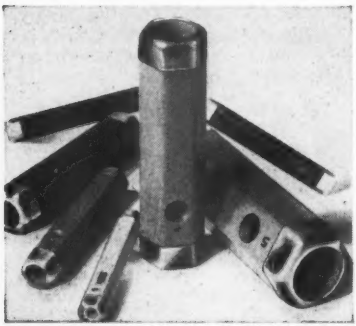
THE GAGE BLOCK SET OF TOMORROW . . . HERE TODAY.

FEDERAL

Taperlock Plastic

GAGE HANDLES

Made of durable plastic material, one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue . . . an advantage appreciated by women inspectors.



Federal Taperlock Plastic Gage Handles have proved very satisfactory for glass gages. Being so much lighter than metal handles, the danger of chipping and breaking is greatly reduced.

Plastic Handles insulate, protecting gages from bodily heat which might affect accuracy.

Easily marked for identification with the same tools used for marking metal handles. Available in SEVEN sizes—00 for small gages, 0, 1, 2, 3, 4 and 5. In FOUR colors — Red, Green, Yellow and Black.

IMMEDIATE DELIVERY
On Rated Orders

FEDERAL TOOL CORPORATION
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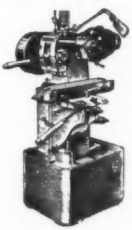
Why Operators Like the Nichols Hand Miller

OPERATORS have their favorites among machine tools. Listen in on their shop talk and you'll hear the Nichols Hand Miller rated "tops"...easy to operate...a producer of close work in volume...and so carefully built that maintenance delays are rare.

Nichols Miller operators like the way "you can get at the work," with the rise-and-fall spindle always directly in front of them. And they can move the counter-balanced sliding head up or down with little effort to any position to bring the cutter to the work or vice-versa. All other controls are also within easy range.

"THE MILLER THAT USES ITS HEAD"



The rise-and-fall principle makes possible the use of simple fixtures, so that even the semi-skilled can load without delay, then change over the machine from one job to the next in rapid sequence.

Rigid, compact construction makes the Nichols Miller the handy machine to have around for dozens of milling, turning, boring and facing operations where tolerances in "tenths" are required. It often does the work of costlier millers, lathes, boring machines or grinders.

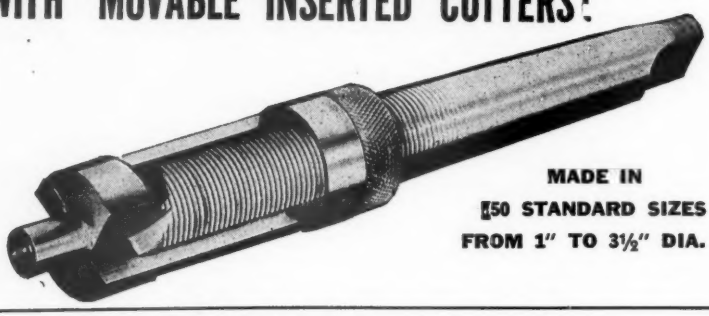
Considered the least expensive "foundation" machine ever built, the Nichols Miller quickly pays for itself in low-cost operation and negligible maintenance. It will make a profitable addition to your production line or toolroom. Investigate its many advantages today. Start by writing for our new illustrated brochure.

THE NICHOLS MILLER (Ni)

MANUFACTURED BY W. H. NICHOLS & SONS, WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 44 CHURCH ST., NEW YORK 7, N. Y.

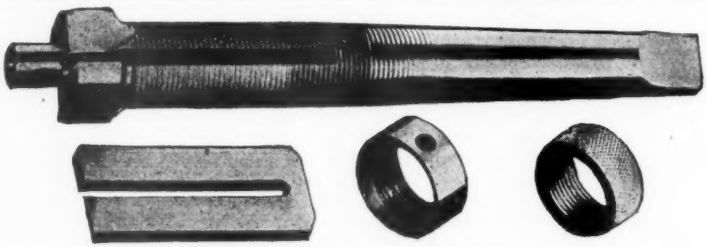
COUNTERBORE and SPOT FACER WITH MOVABLE INSERTED CUTTERS



MADE IN 50 STANDARD SIZES FROM 1" TO 3½" DIA.

only NASH-ZEMPEL has these 12 features

1. Cutter removed easily for sharpening.
2. Cutter always aligned accurately with body of bar.
3. Maximum cutter life.
4. Milled web locates fingers of cutters while cone nut centers rear of cutter.
5. Movement of cutter equals expendable portion.
6. Cutting edge of tool always in same place.
7. Chip clearance in bar—not in cutter.
8. Easy method of locking cutter securely.
9. Economical to operate — only cutter to replace when used up.
10. New cutter — means new spot facer or counterbore.
11. Pilot drilled and tapped to hold different size bushings.
12. Made in 50 standard sizes. Special requirements made to order.



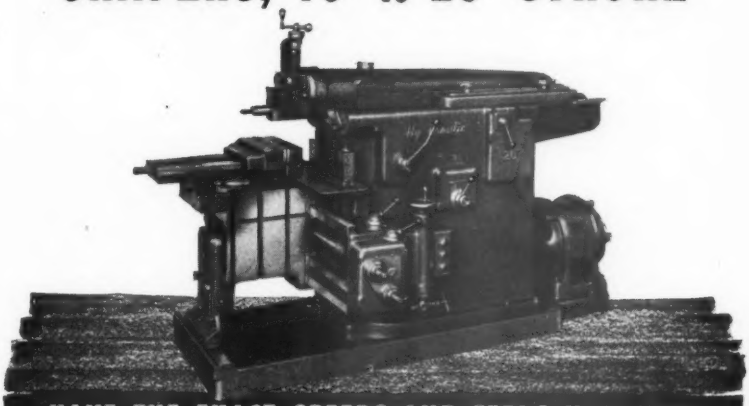
Send for Descriptive Literature

Send in sketch of your requirements and we will be glad to quote prices. Special sizes can be furnished with pilots, straight shanks or special tapers, other than the standard Morse tapers, which are listed on the specification sheet.

ACME TOOL CO. ★ **196 CHURCH STREET NEW YORK 13, N. Y.**

Hy-Draulic

SHAPERS, 16″ to 28″ STROKE



HAVE THE EXACT SPEEDS AND FEEDS YOU NEED FOR THAT WORK YOU WANT TO DO FAST

Infinite adjustment of cutting speeds and feeds in specified ranges is a most important advantage in Hy-Draulic Shapers. It enables operators to get the *exact* combination of speed and feed needed for top production on each job. To meet changing conditions during the progress of any operation; cutting speed, feed, or both, can be altered quickly and easily without stopping the machine. There are no gears to shift, no clutches to service, nothing to interfere with continuous high output.

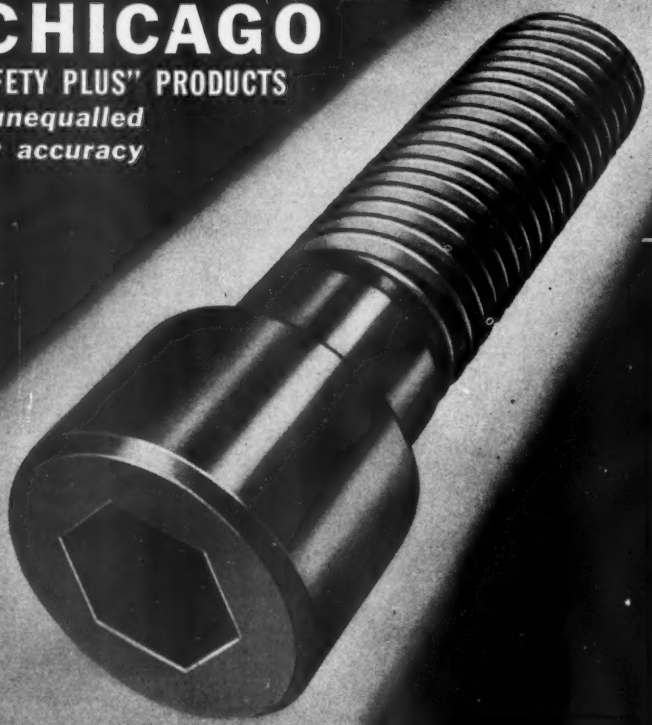
Length of ram-stroke, and its position relative to the work-piece, are established in one simple, easy hand-operation while the machine continues to run. This is another very important exclusive feature of Hy-Draulic Shapers. These tools are built in seven sizes, ranging from 12″ High Speed to 36″ Openside. They are accurate, fast, easy to operate; ideal for rugged war work and in highly competitive commercial service. Investigate. Write today for Bulletin 2503

4407-R-4

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

CHICAGO

"SAFETY PLUS" PRODUCTS
--unequalled
for accuracy



The uniform accuracy, greater strength, fine finish, and superior quality of Chicago "Safety Plus" Products make them universally popular.

Machining on modern precision equipment designed and built to maintain the closest production tolerances results in a product of increased strength, greater accuracy, perfect uniformity and improved appearance.

Chicago "Safety Plus" Socket Screws can help you solve current production problems . . . or contribute to your conversion plans for postwar production.

These Fine Products are sold only thru Authorized Distributors

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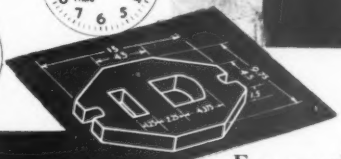
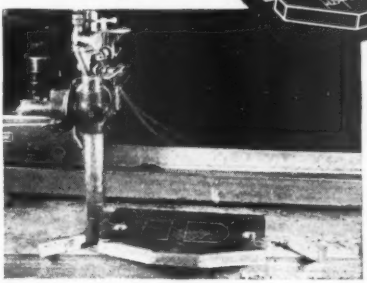
DoALL

Forty-five minutes to cut this shoe from boiler plate—one easy operation and a square, clean finish.

An acetylene oxygen gas torch cut the shoe in less time, but the burnt edges then had to be machined—the two operations requiring three times as long.



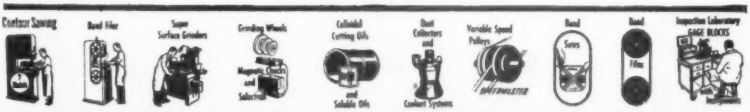


For rough shapes from mild steel, the torch offers a fast cutting method, but for machine finish precision work, use the DoALL.

Another thing, the torch will not cut non-ferrous metals, aluminum, brass, cast iron, bakelite, fibre products — the DoALL will. The torch is impracticable for tool steel shapes, which the DoALL handles easily.

Yes, DoALL cuts them all—today's most modern and rapid machining method. Does both internal and external cutting, following straight or contour lines accurately and without metal waste.

DoALL Advantages over 10 Basic Cutting Methods are shown in pictures in a new booklet. Write for copy today.



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KNOW-HOW

A war-born expression which perfectly describes the ability of a plant organization to plan and accomplish quickly and efficiently a tooling or production project which is usually vital, and frequently critical.

Our wide diversity of such projects has given us a breadth of know-how which we confidently believe is invaluable to manufacturers who require efficient tooling.

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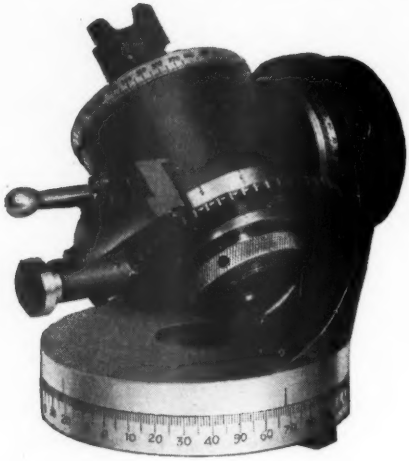
PRECISION PRODUCTION OF PARTS AND ASSEMBLIES

UNIVERSAL INDEXING HEAD

SLASHES GRINDING TIME!



This amazing holding device slashes grinding time in many cases from three hours to five or ten minutes. The reason for this is that the Head indexes 360° in *each* of 3 planes, for *any* possible simple or compound angle, and shifting of tool in holder is unnecessary. The Indexing Head can be used for holding nearly every kind of tool and on any surface grinder.

In addition to holding all standard tools for grinding as enumerated in our special folder, the Universal Indexing Head is easily adapted to holding irregular and large shank tools. Some firms even use it for light milling work. You'll find literally hundreds of uses for it. No other piece of equipment in your shop will prove more adaptable and versatile . . . nor more accurate . . . than the Universal Indexing Head. But—write today for the complete story on how this Head can help you.

CLEVELAND
TOOL ENGINEERING CO.
1261-J WEST FOURTH ST.
CLEVELAND, OHIO

SEND COUPON TODAY!

CLEVELAND TOOL ENGINEERING CO.
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Please send complete story and Data Sheet showing how Universal Indexing Head can help me.

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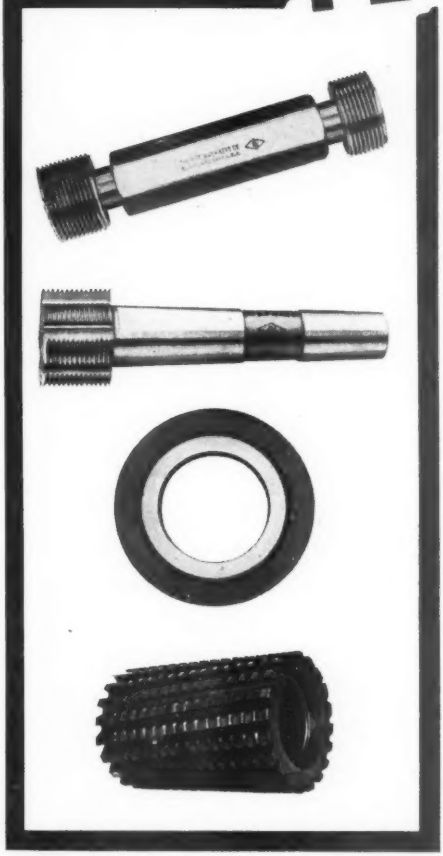
CITY .....ZONE .....STATE .....

The modern importance of TENTHS



Modern mass production is largely the science of making things fit . . . not approximately, but precisely.

Because of this accurate fit of parts, we have better performance, longer life, in all of our machinery.

32 years of experience . . . of qualifying as THREAD SPECIALISTS . . . has made the men who engineer and build Pipe Machinery threading tools and gages completely familiar with modern standards of precision. They know how to maintain these standards on the production line.

The PM trade-mark on tools and gages gives you something to tie to . . . a sure guide to sustained accuracy.

Consult your PM Handbook, or write us about special requirements.

ARMY E NAVY

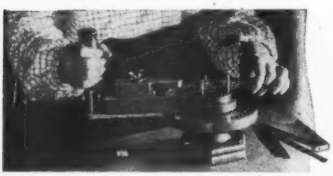
The PIPE MACHINERY COMPANY Cleveland, O.

Talk About PRODUCTION Without DIES!

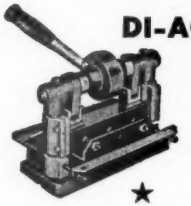
4,000 PARTS per DAY with DI-ACRO Bender

"Enclosed pictures in our plant prove the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on Request.)

Here is an example of "DIE-LESS DUPLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines, — Benders, Brakes, Shears. Picture below shows the DI-ACRO Bender making an acute right angle bend and photograph above shows the finished part formed to die precision. Women operating DI-ACRO units maintain a high out-put on production work.



Pronounced "DIE-ACK-RO"



DI-ACRO Shear

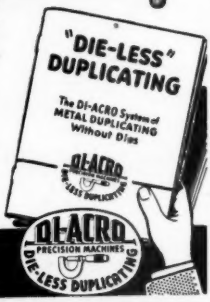
Squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. 3 sizes. Shearing widths, 6", 9", 12".

DI-ACRO Brake

Forms non-stock angles, channels or "Vees". Right or left hand operation. 3 sizes. Folding widths, 6", 12", 18".

Send for Catalog

showing DI-ACRO Precision Machines and many examples of parts made with "DIE-LESS DUPLICATING".



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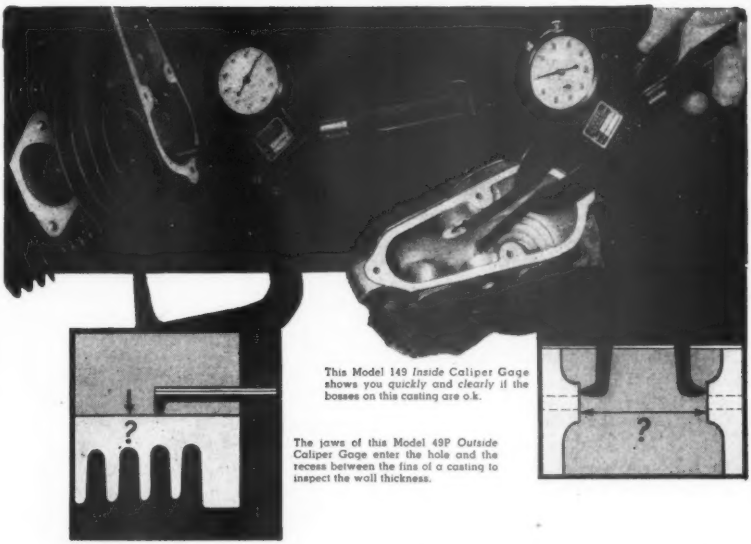

This Model 149 *Inside* Caliper Gage shows you *quickly* and *clearly* if the bosses on this casting are o.k.

The jaws of this Model 49P *Outside* Caliper Gage enter the hole and the recess between the fins of a casting to inspect the wall thickness.

The Easiest Way to Inspect OUTSIDE *and* INSIDE *DIMENSIONS* - - - - -

Dimensions do not have to be limited to fine tolerances in order to get a lot of use from these gages. Their greatest value is their convenience — their quick, easy and direct way of getting into odd positions and telling you whether a dimension is right or wrong, and *how much* wrong. The jaws can be made in every conceivable shape to get practically into any position.

The Model 49 *Outside* Calipers and the Model 149 *Inside* Calipers are equipped with Dial Indicators graduated in .01" or 1/64". They can be furnished for comparing dimensions or for direct measurements. Though not high precision instruments, they are exceptionally popular calipers. Their use has saved many times their cost, time and again. It will pay you to use them rather than take a chance on many a job. Use them on patterns, cores, castings, forgings, tubing, shells, bottles, plastics, formed shapes; in fact, any irregular shaped workpiece. Ask us about a gage with jaws designed to fit your work.

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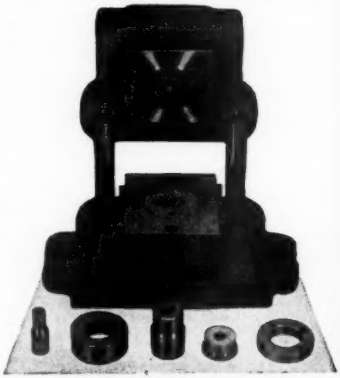
HOVIS UNIVERSAL MASTER WASHER DIES

Outstanding Manufacturers recognize the tremendous advantages in using the Hovis modern way of making washers. No longer do they have to resort to the old, expensive and slow method of making a complete new die for each new size and type of washer. Instead, they make a nominal investment in MASTER WASHER DIES which do not become obsolete. From these dies it is possible to easily and quickly remove FIVE SMALL INTERCHANGEABLE PARTS without dismantling the die. These parts are held in place by the patented Hovis Screwlock principle, the same as is used in holding interchangeable punches and button dies.

Once the initial investment is made in Master Washer Dies of the sizes to meet your requirements, the 5 small interchangeable parts are the only items necessary to purchase to make any size washer. It eliminates process engineering, tool designing, tool making and tool tryout. Saves time, storage space, material and labor. Washers made on short notice as you need them.

Ask today for illustrated, descriptive literature



Made in 5 sizes:
¾"—1½"—2½"—4"—6".

HOVIS SCREWLOCK COMPANY

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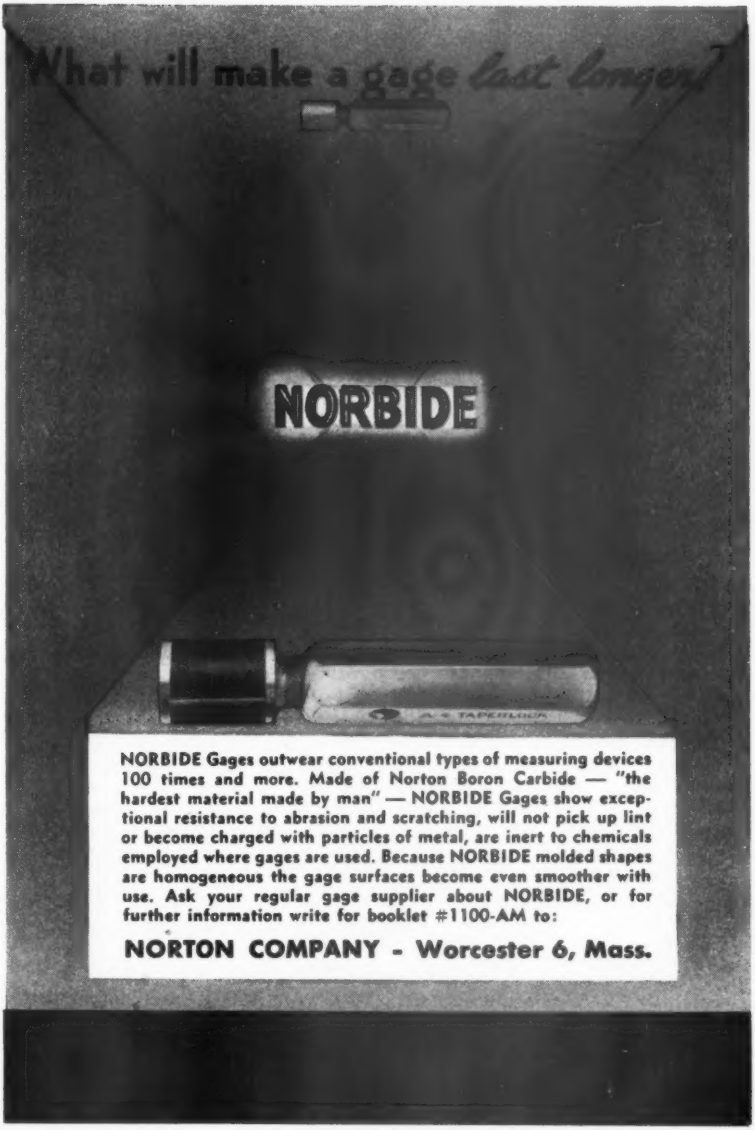
VAN DYKE, MICHIGAN — **Suburb of Detroit**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NORBIDE
NORBIDE Gages outwear conventional types of measuring devices 100 times and more. Made of Norton Boron Carbide — "the hardest material made by man" — NORBIDE Gages show exceptional resistance to abrasion and scratching, will not pick up lint or become charged with particles of metal, are inert to chemicals employed where gages are used. Because NORBIDE molded shapes are homogeneous the gage surfaces become even smoother with use. Ask your regular gage supplier about NORBIDE, or for further information write for booklet #1100-AM to:
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MICHIGAN 7230

CUTTER LIFE TRIPLED

Read how this manufacturer gets more pieces per sharpening and reduces machine down time milling hard forgings...

This large mid[illegible] manufacturer of automotive brake equip[illegible] has experienced a 200% increase in the life of standard 4-inch milling cutters used to machine [illegible] hard forgings by Cold Treating in a Deepfreeze Industrial Chilling Machine. In addition, the number of pieces milled per sharpening was materially increased after Cold Treating with a corresponding decrease in machine down time.

Why Cold Treating Increases Tool Life

What Cold Treating has done for this manufacturer is typical of results obtained in hundreds of plants—results which you can duplicate on your high-speed steel cutting tools.

This is true because Cold Treating at −120° F. in a Deepfreeze Industrial Chilling Machine produces structural transformations which result in the optimum combination of hardness and toughness. This resultant structure of the high-speed steel has greater wear and breakage resistance. Tools thus treated retain their sharpness longer, producing more pieces per grind.

Learn How Cold Treating Can Save You Money

To determine what economies you can obtain by Cold Treating all high-speed steel cutting tools used in your plant, consult the Deepfreeze Engineering Service. The wide field experience of our engineers and our modern metallurgical laboratory facilities are at your disposal to outline proper Cold Treating procedures for the solution of your tool hardening problems. Your request for this service does not obligate you in any way.

FREE... *Cold Treating Data Book*

Here is authoritative, up-to-the-minute data on the use of Cold Treating for hardening high-speed steel cutting tools. In this handy working guide on the use of industry's newest production tool you also get detailed procedures on the use of sub-zero temperatures for shrinking, testing, and stabilization of metals. This book deserves a place in your files. Your free copy of the Deepfreeze Metal Chilling Data Book can be obtained by writing Deepfreeze, North Chicago, Illinois.

CAPTAINS OF INDUSTRY!

Plant your flag on top, too!

This year we've got to make 2=3! We've got to lend Uncle Sam in 2 chunks almost as much as we lent last year in 3. Which means that, in the approaching 7th War Loan, each of us is expected to buy a BIGGER share of extra bonds.

The 27 million smart Americans on the Payroll Savings Plan are getting a head-start! Starting right now they are boosting their allotments for April, May and June—so that they can buy more bonds, spread buying over more pay checks.

Our Marines went over-the-top at Iwo Jima in the greatest, and hardest, battle in the Corps' history. Now it's your turn! Your quota in the 7th is needed to help finish this war, sidetrack inflation and build for future prosperity. So, captains of industry, plant your flag on top—like the Marines at Iwo Jima!

CAPTAINS OF INDUSTRY—here's your CHECK LIST for a successful plant drive:

★ Get your copy of the "7th War Loan Company Quotas" from your local War Finance Chairman. Study it!

★ Determine *your* quota in E Bonds—the backbone of every War Loan.

★ Arrange for plant wide showings of "Mr. and Mrs. America"—the new Treasury film.

★ Distribute "How to Get There"—a new War Finance Division booklet explaining the benefits of War Bonds.

★ Circulate envelopes for safekeeping of bonds.

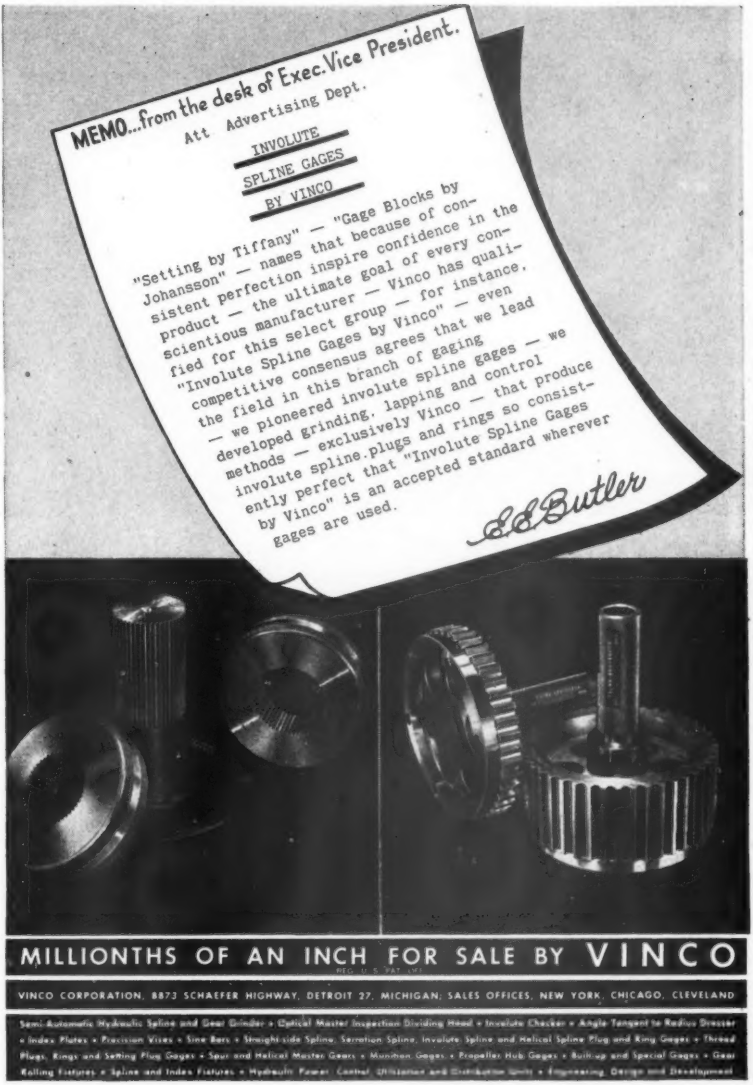
★ Display 7th War Loan posters at strategic points.

★ And—see that a bench-to-bench, office-to-office 7th War Loan canvass is made.

The Treasury Department acknowledges with appreciation the publication of this message

STAFF OF THE TOOL & DIE JOURNAL

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council


MEMO...from the desk of Exec. Vice President.
Att Advertising Dept.
INVOLUTE
SPLINE GAGES
BY VINCO
"Setting by Tiffany" — "Gage Blocks by Johansson" — names that because of consistent perfection inspire confidence in the product — the ultimate goal of every conscientious manufacturer — Vinco has qualified for this select group — for instance, "Involute Spline Gages by Vinco" — even competitive consensus agrees that we lead the field in this branch of gaging — we pioneered involute spline gages — we developed grinding, lapping and control methods — exclusively Vinco — that produce involute spline plugs and rings so consistently perfect that "Involute Spline Gages by Vinco" is an accepted standard wherever gages are used.
L.L. Butler

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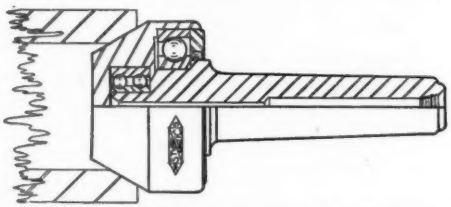
Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power Control Units and Distribution Units • Engineering, Design and Development

LIVE CENTER *adapted to Tube Turning*

The basic design of the STURDIMATIC Live Center is ideally adapted to tube turning . . . extra large sections are no problem with this set-up . . . in most of these cases (see mechanical drawing) there is a tool clearance . . . Characteristic of all STURDIMATIC design is this low overhang which together with a slight cushioning action, that compensates for expansion, due to heat, shock and excessive thrust loads—reduces wear to a minimum . . . we will see that your job gets set up with the right LIVE CENTER . . .



Standards with Morse Tapers (2 to 6) Carried in Stock.
Special LIVE CENTER for turning extra large tubing.

STURDIMATIC TOOL COMPANY
5218 THIRD AVENUE
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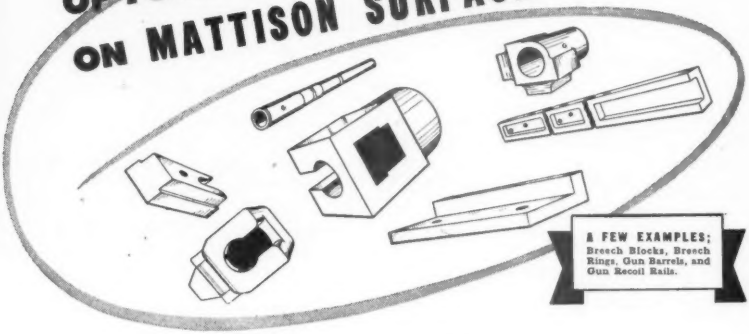
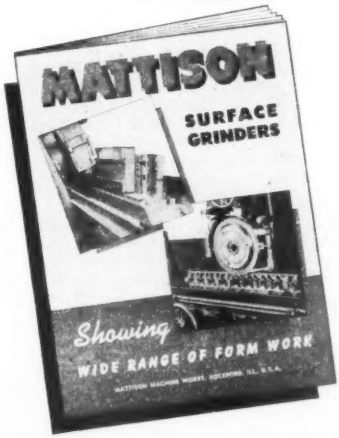
WIDE RANGE

OF FORM WORK NOW BEING GROUND ON MATTISON SURFACE GRINDERS



A FEW EXAMPLES; Breech Blocks, Breech Rings, Gun Barrels, and Gun Recoil Rails.



Through the use of special fixtures and contour dressing devices the above parts are all being ground on the Mattison High-Powered Precision Surface Grinder with a great saving of time and to extremely close limits of accuracy. These applications are important, not only from the standpoint of present production needs, but because they illustrate the unlimited capacity of Mattison Grinders over and above regular flat grinding. To you it opens up a new opportunity for grinding, a new opportunity for saving and a new opportunity for increasing production on work previously thought impossible to grind.

Ask for new free book, showing these and other unusual jobs ground by means of special fixtures and dressing devices on the Mattison Grinder.

Send for this NEW BOOK

MATTISON MACHINE WORKS—ROCKFORD, ILLINOIS

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for . . .
DEPTH, LENGTH,
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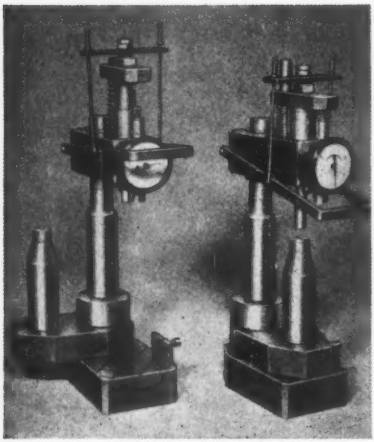


THICKNESS GAGE

This high-speed, durable, and accurate gage enables you to take readings of variations as small as .0001". Each individual depth and length dimension can be checked visually, and errors determined. No expensive or complicated measuring equipment is required either for checking or setting. A simple master setting gage supplied with each SUN DIAL INDICATOR GAGE provides a quick and dependable method of setting and checking.

These instruments are being used in inspection rooms and on production lines by ordnance manufacturers working for the U. S. Army, Navy and Air Force.

Descriptive folder will be sent you on request—no obligation.

SUN TOOL AND GAUGE CORPORATION
380 Canal Street · New York City

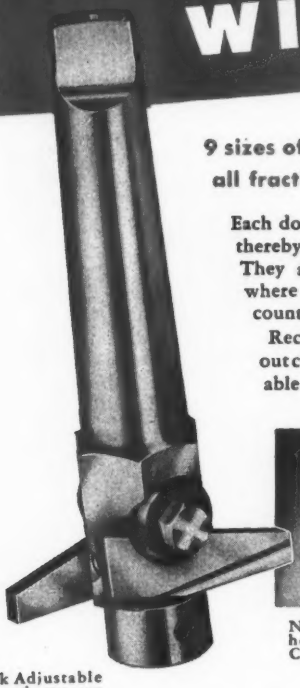
The World's Finest BORING and Milling Machine is made in Detroit

This new Model 3-B JIGMIL has automatic power means to position the spindle from one location to another accurately to within much less than .0001 (one ten-thousandth part of an inch). Thus, extreme laboratory accuracy is conveniently available with ordinary skill that would normally make such precision very high in cost. This, and many other refinements, go further to prove that the JIGMIL Idea is a totally new approach to the problems of precision boring at a new low cost.

On June 17th we received the Army-Navy white star for continued excellence

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

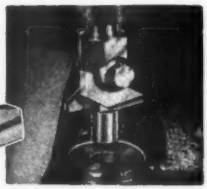
WHY USE 63 WHEN 9 WILL DO?



9 sizes of Clark Adjustable Counterbores cut all fractional diameters from ¼" to 5½".

Each does the work of 7 or more fixed-radius cutters, thereby reducing tool inventory costs considerably. They are particularly suitable for tool rooms, where tool and die makers are constantly needing counterbores of different sizes.

Recommended surface speeds are faster, and without chatter. Exclusive, burr-preventing interchangeable pilots available from $^{3}/_{16}$" up, by sixteenths.



No de-burring of pilot holes necessary with Clark Counterbores.

Clark Counterbores spot face as well as bore.

Clark Adjustable Counterbores are easily expanded. Simply loosen the locking bolts and slide cutting blades in or out. Blades are removable for sharpening.

CLARK CUTTERS

Robert H. Clark Company

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BEVERLY HILLS • CALIFORNIA

For complete information, call your Clark Cutter Jobber today or write for catalog TDJ-4-CB.

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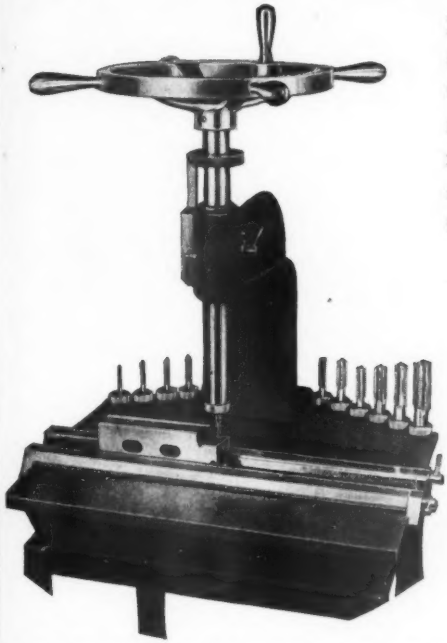

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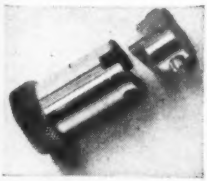

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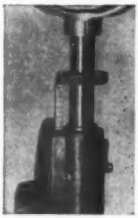

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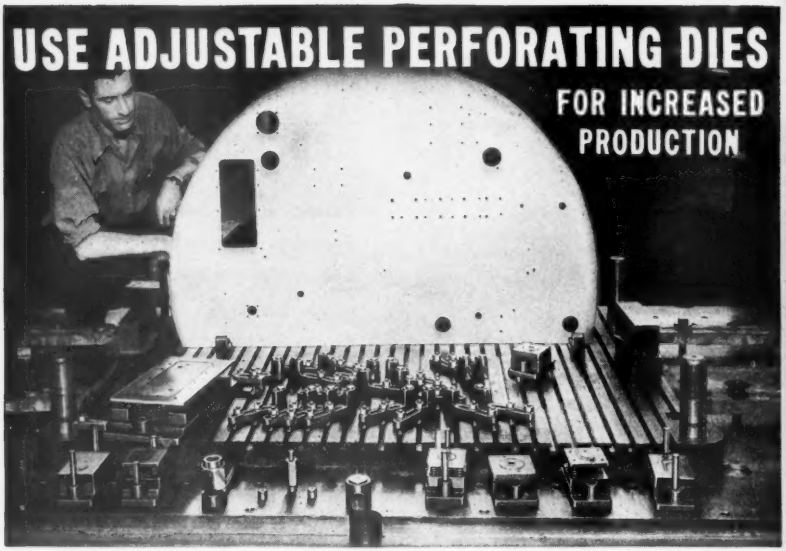

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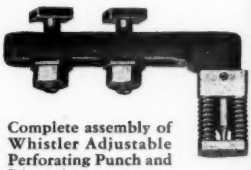

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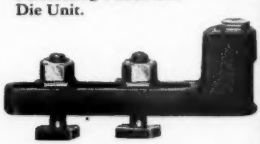

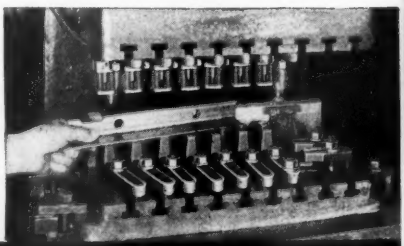

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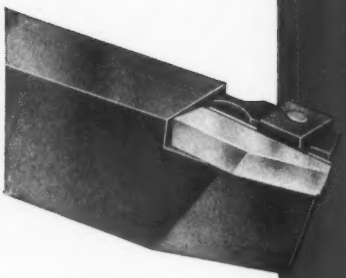

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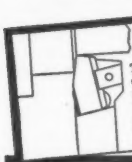

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Tom has learned much in the service that will benefit you. He has learned new technical skills, new ideas. His war-born experiences are sure to help you. So look for him when he returns . . . and you are sure to enjoy renewing that old acquaintance.

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Stop! Look! Listen!

Again we are being told that V-E Day will be upon us soon. Predictions of what will follow on the homefront range from confusion due to lack of intelligent planning for the half-war half-peace operation of industry and business to the likelihood of another NRA. This, most of us remember, was the National Recovery Act devised to "re-activate" business during the depression years of the 1930s. The Supreme Court declared the Act unconstitutional and invalidated it in May, 1935.

The newest Federal effort to smooth the way for industry and business heads up in the CPO, which, translated, means the Committee for Period One—the interval between Victory-Europe and Victory-Japan. That there is disagreement on the basic approach to reconversion after it is no longer necessary to manufacture war materiel for Europe is plainly evident. Far be it from us even to attempt to predict the course which will be laid out for us except to venture that controls and regulations will continue. Until the defeat of Japan is assured some degree of control is doubtless necessary, but thereafter we must return to our proved policy of freedom for the individual.

This editorial is not being written so much as a prediction of what is in store for us in the immediate future as to arouse concern over the seriousness of what has been happening to us since long before the war and what will transpire after the war unless many of us take a tuck in our thinking, and have the courage of our convictions.

Recently Newsweek carried an article by Ralph Robey outlining in no uncertain terms "the plan" which he believes we are expected to follow post-war. Briefly, Mr. Robey states that a National Production Council is to be established as an over-all "planning agency" *which will be responsible for our entire economy.* Quotas for production are to be set to ensure full employment. If a company sustains a loss from inability to sell all of its quota, the government may make restitution. Prices will be controlled, wages will be fixed, labor will receive an annual wage and no company may enter a new field without appropriate governmental agency approval. There are more predictions but these refer particularly to industry.

Our current reading includes also a condensation of *Friedrich A. Hayek's "The Road to Serfdom", and as a result of reading it we have acquired a new and quite undesirable definition of "planning". We have never thought of a plan as anything but desirable but Hayek has convinced us that as the word is being used in our country today it represents an effort in which

*Reader's Digest, April 1945.

we should have no part. Hayek says: "Only since industrial freedom opened the path to the free use of new knowledge, only since everything could be tried—if somebody could be found to back it at his own risk—has science made the great strides which in the last 150 years have changed the face of the world. The result of this growth surpassed all expectations. Wherever the barriers to the free exercise of human ingenuity were removed, man became rapidly able to satisfy ever-widening ranges of desire. By the beginning of the 20th century the workingman in the Western World had reached a degree of material comfort, security and personal independence which 100 years before had hardly seemed possible."

This industrial freedom recognized the right of the individual to progress according to his ability to demonstrate intelligence, ingenuity, resourcefulness and persistence. The cultivation of these faculties by more than one individual stimulated desire and purpose to excel and thus developed competition. This individualism "is based on the respect of Christianity for the individual man and the belief that it is desirable that men should be free to develop their own individual gifts and bents. This philosophy, first fully developed during the Renaissance, grew and spread into what we know as Western civilization. The general direction of social development was one of freeing the individual from the ties which bound him in feudal society," liberating him, as it were, which probably came to be known as "Liberalism".

Individual wealth then began to accumulate and this "came to be regarded as a secure and imperishable possession". Hayek believes that "the principles which had made this progress possible came to be regarded as obstacles to speedier progress", thus "the very success of liberalism became the cause of its decline", and we moved into the beginning of socialism. "During the last quarter of the 19th century and the first quarter of the 20th, Germany moved far ahead in both the theory and the practice of socialism, so that even today Russian discussion largely carries on where the Germans left off. The Germans, long before the Nazis, were attacking liberalism and democracy, capitalism and individualism."

For some time now there has been prevalent in our national life a type of thinking which would replace with a planned freedom the competition generated by individualism. In the former the individual serves the group; call it what you will—"society", "the state" or "the nation". Thus freedom from want might be assured but "freedom" becomes a word descriptive of the individual's "reward" for service to the group. To achieve this, however, all of the people must be regimented. The Rule of Law which prevails in a free country must be replaced with Government which "in all its actions is bound by rules fixed and announced beforehand—rules that make it possible to foresee with fair certainty how the authority will use its coercive powers in given circumstances and to plan one's individual affairs on the basis of this knowledge". On the other hand, in a free country like ours "the individual is free to pursue his personal ends, certain that the powers of government will not be used deliberately to frustrate his efforts" if his actions do not violate "the normal rules of the game". It must then be evident that for the individual the beneficence of "planning" is an exchange of his indi-

vidual freedom for a so-called freedom developed under the coercive action of an undemocratic government.

That we have been and are now being regimented in many ways can hardly be denied. It may be necessary in wartime to set aside the democratic processes which we have developed (but which we are determined not to lose) in order that every individual and every resource, industrial and otherwise, shall be utilized most effectively in the period of emergency. Therein lies the reason for our Chief Executive being, under the Constitution, the Commander-in-Chief of all military forces. It is his duty to so direct them that our country is defended against its enemies. Even under these circumstances, however, our democratic processes require that the Congress act to implement his powers. In the present war period many believe that executive powers have usurped the legislative under the argument that our Congress is unwieldy and cannot act with sufficient dispatch to cope with critical events. The remedy for this, of course, is not to change any of the fundamentals inherent in the relationship between the executive and the legislative bodies but to reorganize procedures, eliminate red tape, or at least reduce it, and definitely to establish a state of genuine co-operation. In all of this we would not be sacrificing our democratic ideals or processes. When the abnormal requirements of the European and Asiatic wars have been satisfied and we can begin to think and work in terms of peacetime normalcy, every American must face the fact that we are being led away from our democratic principles. If it is because of a human longing for national security then let's remember that we have proved that our "system of private property is the most important guaranty of freedom" of the human individual.

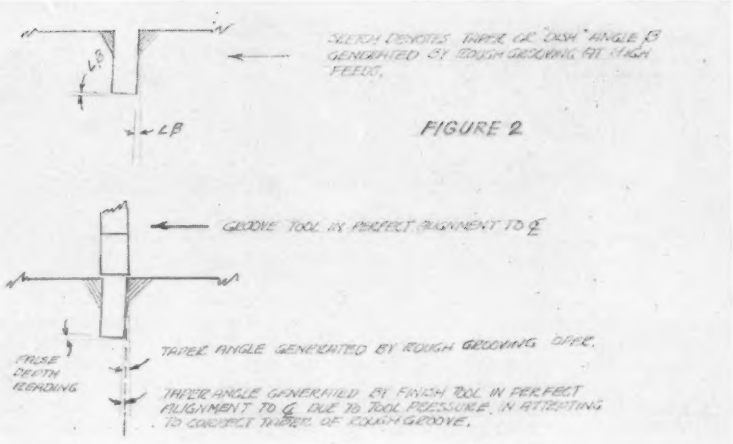
It was Benjamin Franklin who said: "Those who would give up essential liberty to purchase a little temporary safety deserve neither liberty nor safety"; and in his new book Hayek says prophetically: "There can be no question that adequate security against severe privation will have to be one of our main goals of policy. But nothing is more fatal than the present fashion of intellectual leaders of extolling security at the expense of freedom. *It is essential that we should relearn frankly to face the fact that freedom can be had only at a price and that as individuals we must be prepared to make severe material sacrifices to preserve it.*"

We have sent our boys to all parts of the world to stamp out dictatorial power over the individual. *They* are giving their lives to achieve it.

We sincerely recommend that you read Friedrich Hayek's "A Road to Serfdom". It is one of the most important books of our generation. If you can't buy it or haven't Reader's Digest, we will send you a reprint upon request.

Editor

1882 ★ FRANKLIN DELANO ROOSEVELT ★ 1945
President of The United States
March 1932—April 1945


SKETCH DEPICTS TAPER OR "DISH" ANGLE IS GENERATED BY ROUGH GROOVING AT HIGH FEEDS.
FIGURE 2
GROOVE TOOL IN PERFECT ALIGNMENT TO ℄
FALSE DEPTH READING
TAPER ANGLE GENERATED BY ROUGH GROOVING OPER.
TAPER ANGLE GENERATED BY FINISH TOOL IN PERFECT ALIGNMENT TO ℄ DUE TO TOOL PRESSURE IN ATTEMPTING TO CORRECT TAPER OF ROUGH GROOVE.

Close Tolerance Groove Tooling

by A. W. Ehlers
McQuay-Norris Manufacturing Co.
Connersville, Indiana

The deep grooving of metals and plastics to close tolerances has always presented a major machining problem to tool designers. Involved are such items as tool pressures, shank deformation, feeds, speeds, "lead off" and adequate clearance angles. However, now that close tolerances are mandatory in modern design the problem has become critically amplified. In the past, tool designers when confronted with close tolerance restrictions always had recourse to finish grinding and, when necessary, lapping. In the case of deep, narrow grooves, grinding cannot be resorted to so easily due to the weakness of thinned wheel sections and the inevitable wheel breakdown. The necessary conclusion then is that the tolerance restrictions of width, depth and taper angle must be met with a single point cutting tool.

Applications

In many cases metal and plastic pistons for various applications must have the piston ring grooves machined to .0005" width tolerances, .001" depth tolerances and taper angle tolerances of from 2 to 4 minutes. This is necessary not only for one tool, but in most cases involves a multiple tool setup of 8 to 10 tools and tool spacers in a single block.

Relative to heat radiation fins on various types of cylinder blocks such as air-cooled engines, air compressors, hydraulic systems, refrigeration pumps etc., the usual pre-war practice was to cast these fins as closely as foundry practice would permit. No machining of the fins seemed necessary other than the usual deburring and scarfing operations, as adequate heat dissipation could be accomplished.

However, the designers of piston and cylinder assemblies have found that the loose fits deemed so necessary on air-cooled applications were in most part contributory to power losses and undue wear factors. The practice today is to

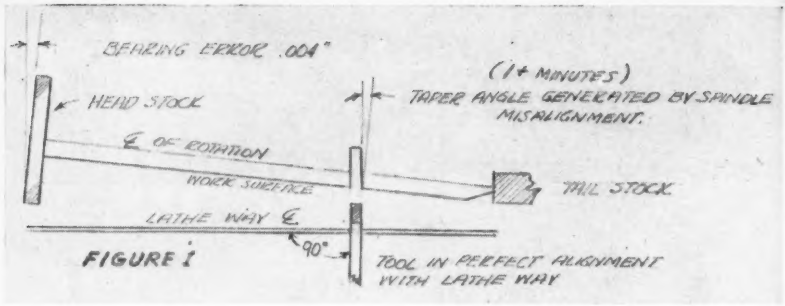


FIGURE 1

employ a close fit between the cylinder and the piston. Another allied trend is the increase in revolutions per minute with shorter piston stroke. All of these changes in design are heat generating factors demanding rapid and controlled heat dissipation. The rough cast fins are no longer adequate. Thus, the deep grooving of these castings presents another postwar tooling problem.

In the case of plastics, the field is wide open. A significant example is the deep grooved winding bobbin in the textile field. Plastic molding is, of course, developing towards very close tolerance accomplishments. However, in the case of phenolic and the aniline-formaldehyde resins their uses in the electrical fields would indicate to the writer that such deep precision grooving will also have to be accomplished by machining if the extremely exacting dielectric tolerances are to be attained.

Machine Equipment

The writer in his experience with machining deep precision grooves has found that the average, first operation, multiple spindle automatic is not capable of close tolerance grooving due to several inherent factors, namely: collet wear, chucking discrepancies, spindle condition and block travel taper to theoretical center lines. However, special chucking automatics are being used on pistons with only average tolerances of .001" to .002" in width and .005" to .010" in depth.

The ideal machine for deep, precision grooving is the single spindle automatic of which the Sundstrand and the Faye are typical examples. This type of machine, however, needs very close attention as to the alignment of the spindle and tail stock assemblies with the exact centerline. Chucks, centers and machine ways must be ground to precision and the front and rear tool blocks must be in perfect alignment. Figure 1 shows the taper angle generated when bearing alignment is out only .004" per foot. Especial attention should be paid to the spindle bearing condition as multiple tool blocks, even at slow feeds, develop severe horizontal pressures against the heaviest of spindles. In some machines, the single bronze bearings (even with careful scraping) have proved inadequate to prolonged, precision production. These bearings had to be removed, the frame housing rebored and precision roller or ball thrust bearings installed.

The writer has also found that two operation grooving should be avoided. The rough grooving operation was intended to remove stock at a high rate of feed. The finish grooving operation was intended to attain final accuracy. Figure 2 indicates that the "dish" or taper angle generated in the roughing operation will be carried out in the finishing operation even though the finish operation tools are in perfect alignment. The

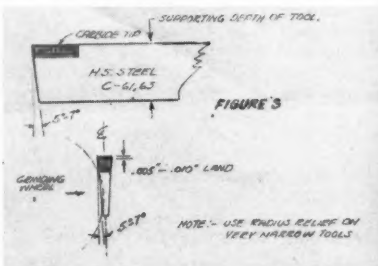


FIGURE 3

thin tool will invariably "lead off" due to the unequal cutting pressures arising from unequal stock removal. With the roughing cut feeds reduced to produce a cut of no taper the economy of the additional finishing cut would be in doubt if the entire operation could be accomplished by the finishing tool at a comparable feed.

Tool Design

The grooving tool design itself presents a problem and the writer has found that a carbide-tipped tool is the more practical because the longer tool life amortizes the necessary high cost of the time and effort needed to manufacture such a tool to close tolerances. The use of the carbide-tipped tool naturally precludes the average first operation automatic (mentioned in a previous paragraph) due to inadequate spindle speeds especially if drilling and reaming are a part of the tool setup.

The construction of this tool has been outlined in the March 1944 issue of Tool & Die Journal; however, Figure 3 is presented here for further consideration. It will be noticed that the tool shank is made from hardened high speed steel instead of the usual cast or cold rolled shank materials. A good grade of hardened and ground high silicon spring steel may be substituted for the high speed steel. The obvious reason for the stiff and non-deformable shank is that it is necessary on very thin tools due to tool pressures. The supporting depth of the tool shank should be dimensioned as outlined in the straight line graph of Figure 4 which is based upon the depth of groove divided by the width of the tool.

The grinding of the grooving tool is a precision operation on a surface grinder due to the combined surface of high speed steel and carbide which the grinding wheel must grind as one, as depicted in Figure 5. During the grinding operation the tool must be turned over very frequently to prevent warpage and too much taper on one side. The grinding of the relief angles can be accomplished on a tool and cutter grinder after the width tolerance has been established on the surface grinder. By leaving a .005" land on each side of the tool this relief grinding will not disturb the original size attained. The relief grind can be polished with a diamond impregnated wheel.

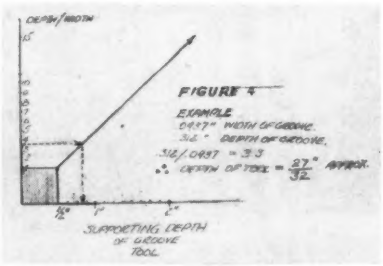
Tool Construction

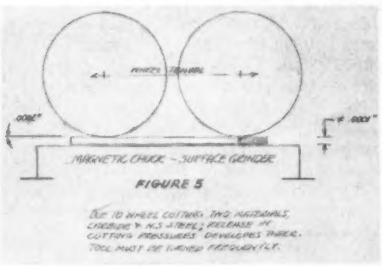
If several tools and spacers are used in combination tooling it is evident that too great a cumulative taper tolerance error will cause a dish or taper angle in the groove itself, due to the combined tolerance errors.

Combination tooling of multiple grooves with close tolerances presents the problem of suitable tool blocks. There are two schools of thought on the construction of these blocks. One school favors the magazine block which carries removable tool spacers so that different combinations can be made with the same block. The other school advocates a fixed block with thick spacers for each job. The first block has the advantage of easier construction and greater adaptability, but has the disadvantage of disturbing the entire setup when a single tool becomes dulled or broken. The second block is quite difficult to construct where tolerances of narrow fixed slots are concerned. If narrow tools and spaces are specified, the block should be constructed of accurately ground flats.

In assembling these ground flats, several methods have been used. One of

(TO PAGE 112—PLEASE)




WHEEL TRAVEL
.005"
.005"
MAGNETIC CHUCK — SURFACE GRINDER
FIGURE 5
DUE TO WHEEL CUTTING, TWO MATERIALS, CARBIDE & H.S. STEEL, RELEASE AT CUTTING PRESSURES. DEVELOPES TAPER. TOOL MUST BE TURNED FREQUENTLY.

Selecting Carbides For Milling

by Fred W. Lucht
DEVELOPMENT ENGINEER
Carboloy Company, Inc.
Detroit, Michigan

When starting a new milling operation with carbides or when changing from high speed steel to carbide tipped cutters, an inevitable problem is the selection of the proper grade of carbide from among the many available. Increased knowledge as to the other factors contributing to good results, however, has so simplified grade selection over what it was a few years ago that today a total of five "grades" of carbide as produced by Carboloy suffice to give optimum performance and cutter life over virtually the entire range of milling jobs. This holds true, of course, only if the basic requirements of good carbide milling practice are observed.

Grinding

Cutter sharpening is one of the factors which can make or break any carbide milling application. In general, carbide removal per wheel pass should not exceed 0.0004" for rough grinding or 0.00015" for finish grinding. Enough carbide must be removed from each worn cutter tip to get down to good solid metal again, but any attempt to remove too much carbide at a single pass of the wheel may result in heat checks which will ruin even the best grades of carbide. Examination of the ground surfaces through a magnifying glass of 20 or more magnifications will usually show how much carbide metal should be removed. If insufficient stock has been removed, fine, hair-like lines will appear on the carbide's surface. These lines will cross the cutting edges at several points. Cutter life will be materially shortened if enough stock is not ground off since these hair-like lines afford excellent starting points for cutting edge breakdown.

Cutter Design

Perfect grinding practice, however, will not offset incorrect cutter design. For instance, double negative angles should be used in most cases when milling steels and tough, hard cast irons. Present indications are that cutters with 10° negative axial rake and 10° negative radial rake will give best results when milling the harder steels; whereas 5° positive radial rake angles can be used for soft steels. Furthermore, enough chip room should be provided in the cutter so the chip will not heat up and get sticky, a condition which may result in the chip's being pulled through a second time to the detriment of the cutting edge.

Setup

Setup conditions of the specific job, particularly as they affect rake angles, should always be taken into consideration when designing a carbide cutter. Since negative rake angles are used to keep the chip load away from the cutting edge and the nose, the axial rake angle should be large enough so that the impact load is taken at a distance equal to the depth of cut away from the cutter face. The impact load should also be taken at a distance from the peripheral cutting edge on the tooth face equal to the chip thickness.

Since it is possible to put negative angles on the cutter and yet, due to setup conditions, have the load come on the cutting edge or nose as the tooth enters

CHART FOR SELECTING THE CORRECT CARBIDE GRADES FOR MILLING

MATERIALS	JOB	JOB CHARACTERISTICS	REQUIRED QUALITIES IN CARBIDES	SUGGESTED CARBIDES
STEELS	Rough Milling	All	Cratering Resistance. Toughness. Wear Resistance Edge Strength	Tungsten-Titanium-Tantalum Carbide. (Grade 78B).
	Finish Milling	Heavier Feeds or Cuts	Wear Resistance. Cratering resistance. Toughness. Edge Strength.	Tungsten-Titanium-Tantalum Carbide Grade No. 78 Harder or 78B tougher
		Lighter Feeds or Cuts	Same as above; even more abrasion resistance and edge strength	Straight tungsten carbide. Grade No. 883.
PLAIN CAST AND MALLEABLE IRONS	Rough and Finish Milling	Rough Castings	Toughness. Wear Resistance. Cratering Resistance	Straight Tungsten Carbide. Grade No. 44A.
		Smoother Castings; Finishing Cuts; etc.	Abrasion resistance. Toughness. Cratering Resistance.	Straight Tungsten Carbide. Grade No. 883. (Greater abrasion resistance)
STEEL TYPES OF CAST AND MALLEABLE IRONS OR IRONS WITH HARD SECTIONS	Rough And Finish Milling	All	Cratering Resistance. Abrasion Resistance. Toughness.	Tungsten-Titanium-Tantalum Carbide. Grade No. 78 or 78B for those irons most nearly approaching steel in character
				Straight Tungsten Carbide. Grade No. 883 when higher abrasion resistance is required.
ALUMINUM ALLOYS	Rough and Finish Milling	General Milling	Abrasion Resistance. Toughness. Wear Resistance. Ability to take & retain a keen edge.	Straight Tungsten Carbide. Grade No. 883.
		Form Milling	Same as above. Must also resist formation of a built-up edge.	Tungsten-Tantalum Carbide. Predominantly Tungsten. Grade No. 907
MAGNESIUM; ZINC ALLOYS; BRASS; BRONZE; PLASTICS; FIBER; ETC.	Milling	All	Abrasion resistance. Wear Resistance. Toughness.	Straight Tungsten Carbide. Grade No. 883.

the cut, it is good practice to check the cutter setup and make sure that the actual effective angle between cutter and work is in line with the desired rake angles.

Feeds and Speeds

Feed per tooth should be high enough to avoid concentration of chip load near the cutting edge. Optimum feed per tooth for milling steels has been found to be between .008" and .012". Best cutting life is usually obtained when cutting edge enters the cut with a thick chip. Chip thickness is at its maximum and equal to feed per tooth when edge of work where cutting edge enters it is at cutter center line parallel with direction of feed. If work is moved in either direction at right angles to direction of feed, chip thickness will gradually decrease.

Too high a speed increases carbide wear; whereas speeds which are too low cause a built-up edge to form, resulting in poorer finish and reduced cutter life. A steel having a Brinell hardness of 110 seems to be milled best at about 750 sfpm. Heat treated alloy steels with hardness as high as 400 Brinell will mill best at about 360 sfpm. Varying the speed with hardness in this manner has been found to give longest life of carbide cutters.

Vibration and Chatter

Use of flywheels on milling machines gives two definite advantages, particularly when milling at high speeds. A flywheel damps out chatter and high frequency vibrations in the cutter drive resulting from changes in load as the individual cutter teeth enter and leave the cut. This factor is doubly important with carbides since vibration and chatter are more injurious to carbides than they are to the softer cutting tool materials. The second advantage of flywheels is that they help maintain a more constant cutting speed through the entire length of cut, carrying the machine through intermittently heavy cuts without stalling the motor or slowing it down below the cutting speed which is desirable with carbides.

As for size of flywheel, a good rule-of-thumb is to make the flywheel bigger than the cutter and also larger than the largest gear on the main spindle. Putting a lot of beef into the cutter body also helps smooth out the cutting action.

Grade Selection

Any chart of the nature of the one shown here, in which major classifications of milling jobs as they affect grade selection are listed, has a natural tendency toward over-simplification. However, the user cannot go far wrong by *starting* with the suggested grade, providing other requirements have been met, and then changing to another grade if the job gives indications of requiring greater emphasis on some other carbide "quality".

Steel Milling

Steel milling is divided into three classifications based on a shifting of the relative importance in qualities required in the carbide. All carbide qualities given here are *relative* as between *grades of carbides*. For instance, *all* grades of carbides are more *wear* and *abrasion* resistant than are other commonly employed cutting tool materials. However, simple tungsten carbides are *more* wear resistant than are the tungsten-titanium-tantalum carbides; while these "triple" carbides, in general, are *tougher* than straight tungsten carbides.

In rough milling steels where chip load is heavy, maximum cratering resistance (as provided by carbide grades of the 78B type) is usually of primary importance. Toughness, wear resistance, and edge strength under impact loading, in their order of relative importance, are also required characteristics of the carbide suitable for such work.

A straight tungsten carbide is suggested for finish milling if cuts or feeds have to be light, since under such conditions the cutting edge has to resist more abrasion than is encountered where heavier cuts or feeds are possible.

For heavier finishing cuts, an option of two grades is suggested. In general, if the job comes closer to "rough milling", a grade equivalent to 78B will be more likely to produce best results.

Milling Cast and Malleable Irons

Cast and malleable irons are divided

(TO PAGE 112—PLEASE)

Batcheller, WPB Operations Chief, Expects No Slump After Nazis Fall

Most of the worries about what will happen to jobs and business when organized warfare ends in Europe is entirely unwarranted. This, in effect, was the opinion expressed by Hiland G. Batcheller, War Production Chief of Operations, in a speech before the Advertising Club of Cleveland on April 11.

For some time after V-E Day, Mr. Batcheller explained, this nation will still have to produce about four billion dollars a month of munitions alone, or about 80% of current levels, to maintain a full pipeline to the Pacific war theatre. This, plus the cost of feeding, transporting and paying soldiers, sailors and marines, will mean total expenditures of sixty to seventy billion dollars a year, he estimated.

"This high level of war expenditures creates a tremendous demand for civilian goods and services," the WPB official said. "People will continue to receive more dollars than there will be consumer goods to spend them on. Furthermore, foreign countries will continue to need American production. Great Britain, Russia, France, Belgium, Latin American countries and others will want American machine tools, American machinery and other U. S. industrial equipment to reestablish, rehabilitate or expand their own industries.

"The net is that there will be a huge demand for U. S. products of all kinds. Thus, after V-E Day the problem will not be: Can we sustain employment? Rather, it will be: How fast can we change over to satisfy the demands for our own as well as foreign consumers while at the same time using at least one-third of our resources for war?

"As far as business is concerned," Mr. Batcheller went on, "the American people will be going back to what they have always done. I don't think our manufacturers, when they get down to cases, are going to have trouble closing out contracts; they have been doing it right along and had done it before the war. They've cleared plants before, and they have tooled, retooled, and set up assembly lines dozens of times. In the automobile industry, rearranging tools, dies, fixtures, was an annual prewar habit."

The WPB executive indicated that definite policies and procedures have been carefully worked out by WPB in conjunction with the Army, Navy, Maritime Commission, War Manpower Commission and other agencies for handling cutbacks. These plans, he believes, will operate to free civilian capacity as promptly and fully as is consistent with carrying on the struggle against Japan and with the least possible confusion and slow-down of business.

He further explained that just as soon as possible after V-E Day the War Production Board is prepared to take initial steps toward the final elimination of all its controls over private business. These steps, he explained, will be as follows:

1. Doing away with the great bulk of L and M orders.

2. Replacing the present preference rating structure by a rating reserved exclusively for direct military requirements, with at most a second rating band for essential civilian activities. All other production would be unrated and would constitute the free market except insofar as other controls, such as price ceilings, might apply. The AAA rating band will be retained for emergencies, i.e., to break bottlenecks.

3. Open-ending the Controlled Materials Plan so manufacturers generally will be able to place orders for steel, copper and aluminum, subject only to prior military requirements.

The WPB operations chief, on leave as president of Allegheny Ludlum Steel Corporation, concluded his talk with this significant statement of his views about postwar planning: "I have no sympathy with a planned economy. It is essential in war but the most terrible thing that could happen to the country in time of peace."

First of two parts

Prospects for Principal Cast Metals*

by Donald J. Reese**

"Why is the foundry process of manufacture of value to the engineer in his efforts to build better machines for war or for peace?"

To answer that question we might point out that the foundry process of manufacture is utilized:

1. When the complexity of the component desired by the engineer would involve, by other manufacturing processes, too many manufacturing operations to make production possible within permissible economic limits. Heads of Diesel engines and cylinder blocks for internal combustion engines are examples of such components.

2. When the desired material for the intended service cannot be adapted to other manufacturing processes, or when modifications of engineering materials, intended to direct their utility to optimum service performance, multiply the problems of processing by the usual manufacturing process. Gray iron, for example, is an engineering material which, to date, is adapted only to the foundry process of manufacture.

3. To minimize the number of manufacturing operations between blue-print and finished machine when numbers of similar machines are needed and the element of time is important.

There are, of course, other reasons but these three will serve to help determine the need for and the importance of the foundry process of manufacture.

The foundry industry is an old, old industry; its age is measured in terms of hundreds or thousands of years. In its earliest days its products were objects of art; and to some extent the artistic craftsmanship of the industry persists today. An art object has need for only skin-deep utility, and in most cases the engineer designs on the properties of the material he finds below the surface. It took a long time for the foundryman to shed his objective artistry and to appreciate that the engineer is a realist only slightly concerned with the beauty of the external surface of a foundry product. Although the transition of the foundry industry from an art to a scientific industry has been largely accomplished, the engineering profession has yet to exhibit unqualified acceptance of the dependability of castings. Since the foundry industry has traveled the much longer road in its long history, it may be hoped that the day is not far distant when the engineer can choose from available materials and possible manufacturing processes that material and that manufacturing process which will best suit desired ends.

The foundry industry processes the following engineering materials:

1. Steel, including plain carbon, low alloy, stainless, heat-resisting, high speed tool steel, etc.
2. Gray iron, including modifications of the gray structure referred to as "mottled", "white", etc.

*Abstracted from a paper presented at the WAR PRODUCTION AND FUTURE PLANNING CONFERENCE of the Engineering Societies on War Production in New York City, January 30, 1945.

**Chief, Manufacture and Foundry Products Section, Metallurgical and Conservation Branch, Steel Division, War Production Board, Washington, D. C., (on loan from the International Nickel Co., Inc., New York City), and a member of the Technical Committee, Gray Iron Founders' Society.

3. Malleable iron.
4. Aluminum and its many alloys.
5. Copper and the many types of brasses and bronzes.
6. Magnesium and alloys of magnesium.
7. Lead and various lead alloys.
8. Nickel and various nickel base alloys.
9. Complex metallic alloys containing two or more of the following elements: cobalt, molybdenum, aluminum, chromium, nickel, tungsten, copper, beryllium, iron, phosphorus, tin, antimony, silicon, manganese, etc.

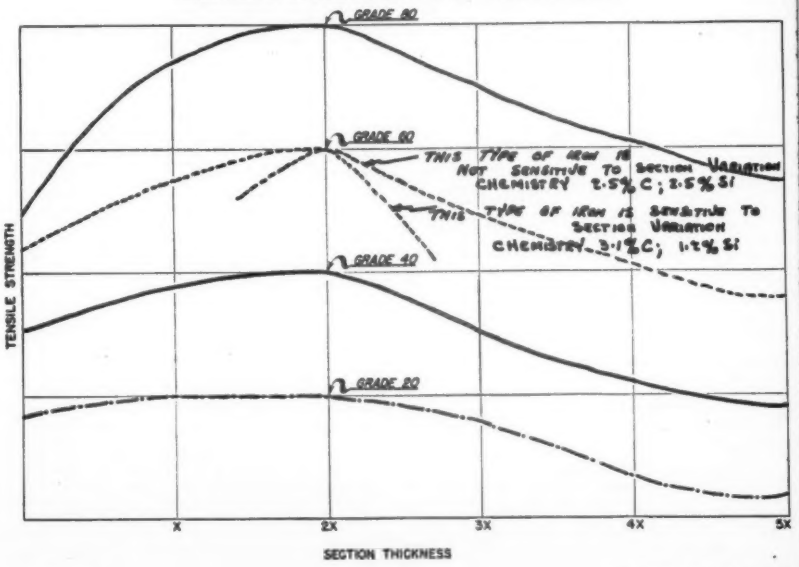
The foundry process of manufacture is also utilized in the dental and jewelry industries to process gold, silver, platinum, palladium, etc.

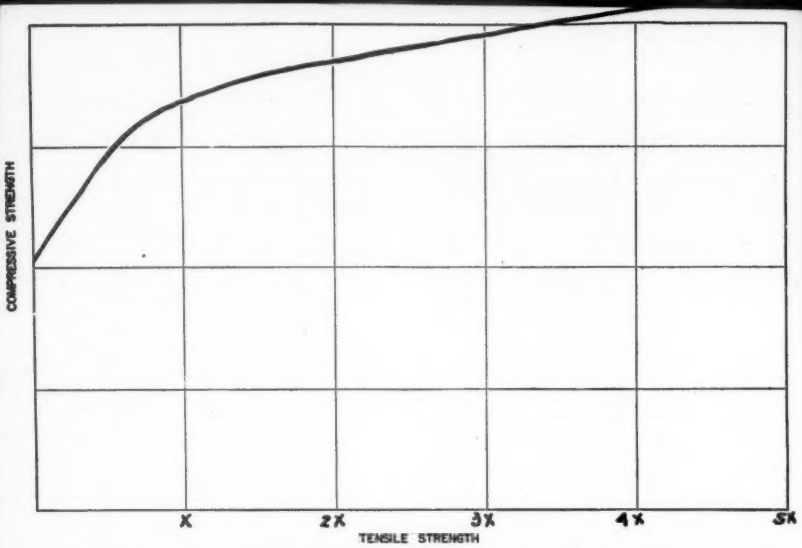
I know of no other industry in which diversity is so overwhelming. Of course, no one foundry attempts to process a great variety of engineering materials. Frequently, however, within one large foundry organization, or in a small foundry in certain geographic locations such as on the West Coast, the diversity of materials processed is great.

During 1944 the ferrous segment—steel, malleable, gray iron—of the foundry industry melted approximately 23 million tons of metal. During that year this segment of the industry was under continual pressure to meet military and critical civilian requirements. Up to the present time this pressure has not lessened, and current forecasts for 1945 indicate increasing requirements.

The foundry industry's No. 1 problem has been, and is, manpower. Its manpower problem is more acute than that of most of the metal industries not only because its best workers have been taken into the services while others have been attracted to the glamour industries, but also, in a real sense, because it was not recognized early in the war that some of the materials processed in the foundry industry were needed to fight and win a war. With curtailment of civilian production of automobiles, farm and railroad equipment, etc., the major part of the foundry industry suffered a business lull until the essentiality of its materials was recognized. During the early part of 1942 the malleable foundry industry declined to 30,000 product tons per

CURVES TO ILLUSTRATE CHEMISTRY AND PRODUCTION TECHNIQUE ADJUSTMENTS FOR CONSTANT SECTION FOR VARIOUS QUALITIES





month. During 1944, however, these same foundries were struggling to reach a 100,000 product tons per month performance, with a backlog of up to 540,000 tons and an actual performance, in the last three months of the year, of 80,000 tons. During the business lull they lost manpower to other war industries.

During 1944 the foundry industry suffered considerably from unfavorable publicity. It was tagged with such terms as "hot", "heavy", "dirty", "onerous", and "low paid". Working conditions in the foundry industry are on a par with other metal industries. Generally, the foundry industry could improve its housekeeping; and its working conditions are not always as attractive as they might be. However, the foundry with the most favorable working conditions has had no less a manpower or absenteeism problem than the average. Generally, the wages in the foundry industry compare favorably with those of other long time industries in the same area. The industry is not only anxious to correct its weak spots, but has a sincere desire to be one of this country's respected industries for another hundred years.

The foundry industry is seldom a prime contractor and frequently is a sub-sub contractor. Since it turns out many millions of component parts each month for this country's war and peace production, it is difficult to determine whether some less essential part is in production while some more important part is not; and, of course, scheduling errors made at any level above the foundry reflect a loss of production while a change to the required part is being effected.

The Controlled Materials Plan brought considerable order out of chaos but the plan was limited to steel, copper and aluminum. It is unfortunate that the term steel was not broadened to include iron and steel as this would have included gray iron and malleable iron and possibly would have directed more effort toward establishing real requirements and to the putting of first things first.

For generations the foundry process of manufacture consisted of pouring molten metal into refractory sand molds. For some years now the industry has been working on its molding technique to achieve dimensional accuracy in the component parts produced by the industry. I refer to the use of metal (permanent) molds, air setting cement bonded silica sand molds, the Fisher process, investment molding (lost wax process), etc. Certain centrifugal casting techniques also achieve high dimensional accuracy but the utility of this development aims to improve the material as well as certain founding procedures.

(TO BE CONTINUED NEXT MONTH)

Application Of Plastics To Commutator Construction And Assembly

by Alex S. Arnott

This use of plastics materials in building commutators for electrical motors serves to insulate the copper segments from each other and also to hold the copper segments in a circle after the commutator is assembled. The properties of each plastic are similar, varying slightly in physical, electrical and fabricating features to suit the mechanical and electrical requirements specified for precision motor building.

Sheet laminated plastic is used for insulating the copper segments and is a mineral filled material with good heat and water resistant qualities which will give great impact strength and endurance. When the commutators are to be used in a high speed motor, the heat or friction caused by "wipe-over" arcing should be taken into account and a plastic which will resist the heat should be used. Resistance to water is a necessary insulating feature for if the motor is exposed to excessive moisture, electrical grounding is likely to occur and interfere with its efficient operation. These sheets are cut into small sections the same size as the copper segments shown in Figure 2.

Bakelite Plastic

One type of laminated plastic successfully used to insulate the segments is Bakelite TM-250 Brown as indicated in Figure 1. This material has ideal physical, electrical and fabricating qualities for this type of product.

The physical properties of TM-250 Brown after the material is molded are as follows:

Specific Gravity, 1.89
Weight per cu. in. 31.0 gms
Tensile Strength 6,000 lbs per sq. in.
Modulus of Elasticity 10 x 10^5 lbs per sq. in.
Impact Strength—Energy to Break, ft lbs 0.5
Impact Strength—Per Inch of Notch, ft lbs 1.0
Molding Shrinkage 0.0010-0.0025" per in.
Flexural Strength 10,000 lbs per sq. in.
Distortion Under Heat 302° F (150° C)
Water Absorption Gain 0.20%
Water Absorption Loss 0.40%

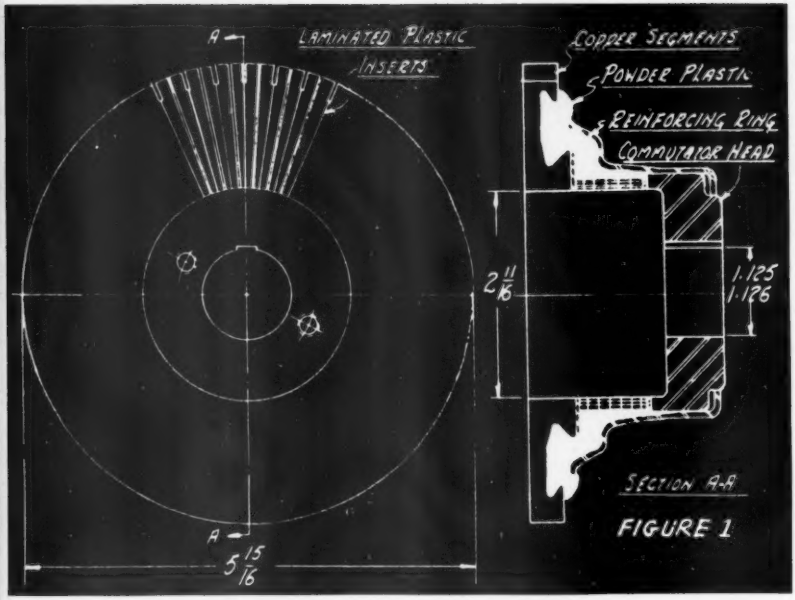


FIGURE 1

Heat Resistance: Not recommended for use where molded parts are to be subjected to temperatures higher than 400° F (204° C)

The electrical properties are:—

Dielectric strength at 60 cycles, 200 volts per milligram

Volume resistivity is 0.2 x 10^5 megohms centimeters.

Fabricating qualities of the raw materials are:—

Tabletting Class IV. Long fibre material.

Recommended molding pressure 3,000 to 4,500 lbs per sq. in.

Recommended molding temperatures 290 to 310° F (143-154° C)

Bulk factor approximately 8.00

Flow range hard only.

The other type of plastic for holding segments in a ring is Bakelite BM-1957 Natural, series 11, and it is used in powdered form. The area this plastic covers after molding is illustrated in Figure 1. Although it is very inconvenient to mold due to the hard flow range, its other features more than make up for the disadvantage of difficult molding.

The physical properties of BM-1957 after the material is molded are as follows:

Specific Gravity 1.37

Weight per cu. in. 22.35 gms

Tensile Strength 5,000 to 6,500 psi

Modulus of Elasticity 10 x 10^5 psi

Impact Strength—Energy to break, ft lbs 0.6 to 1.0

Impact Strength—per inch of notch, ft lbs 1.40

Impact Strength—per inch square, ft lbs 7 to 12

Molding shrinkage .0035 to .0054" per inch

Flexural Strength 8,000 to 9,000 psi

Water Absorption gain 0.6 to 1.0%

Heat Resistance: recommended to a temperature of 240° F (116° C)

The electrical properties are:—

Dielectric strength at 60 cycles, 200 volts per milligram

Volume resistivity 0.1 x 10^5 megohm centimeters.

Fabricating qualities of the raw material are:—

Weight of 1 cubic centimeter powder 0.2 to 0.3 gms

Tabletting Class III
Recommended molding pressure 3,000 to 6,000 psi
Recommended molding temperatures 290 to 330° F (144-166° C)
Bulk factor approximately 7

In reference to the above data, the plastics are molded and pieces are tested in accordance with the A.S.T.M. (American Society for Testing Materials) standard tests. While the data are indicative of the properties of the material, no warranty of such properties in finished commercial articles is implied. This is due to the variable molding conditions arising from different shaped parts and differences in mold design. Experiment, inspection and testing are the means used to determine the quality of the plastic after the molding operation has been completed. A wide margin of safety is allowed on all the factors so that the material will withstand abusive treatment if necessary.

Assembling Fixture

To assemble the commutator into a unit with the copper segments and sheet laminated plastic molded securely in place, the segments and sheets are stamped out with the contour illustrated in Figure 2. The segments are also machined to an angle of 2 degrees on the sides so that they may be fitted together into a circle.

To prepare the segments for the molding operation, a loading fixture is required, as shown in Figure 3. The fixture consists of a base, a ram, a split ring and a solid ring. A ring is made from machine steel with the outside diameter tapered and rounded at the edge

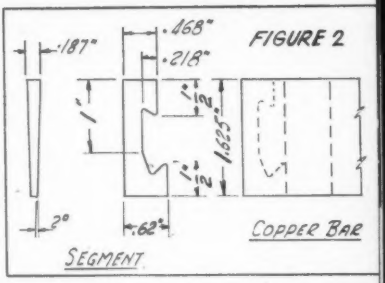


FIGURE 2

for ease of operation. On the inside diameter a shelf or locating surface, on which the segments rest, is machined and the center of the ring is bored out to accommodate the ram of the fixture. The ring is hardened and ground, then cut into six pieces with an abrasive wheel each piece of the ring being free to move independently of the others. This allows the parts to move in or out and gives the ring a range of from 5" to 5½" inside diameter.

A solid heavy walled ring is made with a taper on the inside, to match the taper on the outside of the split ring and is made ⅜" thicker than the split ring.

The fixture ram is dimensioned to contact the surface of the commutator segments and is so counterbored as to give clearance for the split ring sectors and to confine the solid ring to the inside of the counterbore.

The purpose of the fixture is to hold the assembled segments with the plastic insulation inserted between each segment while a hydraulic press exerts pressure on the ram to force the segments toward the center of the fixture

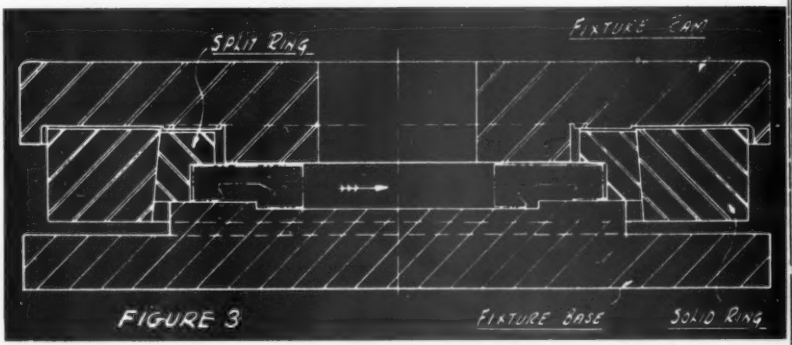


FIGURE 3

thus forming them into a compact ring.

The first step in this operation is to place the segments and the plastic inserts loosely around the surface of the fixture base, using the counterbore in the surface as a guide. The split ring is then arranged in place, the operator spacing the pieces around the outside diameter of the segments with a fair degree of accuracy. The solid ring, with the larger diameter of its taper contacting the smaller taper of the split ring, is lowered into place and the ram is mounted over the solid ring to make the fixture ready for the hydraulic press.

The fixture shown in Figure 3 is illustrated with the assembly in the closed position. In the open or starting position the solid ring just makes contact with the split ring, and when the press is brought down on the fixture ram, the solid ring is forced down and causes the split ring to move along the taper and to gradually become smaller in diameter. The fixture is designed to confine the segments in every direction, except toward the inside, so that the action of the rings forces them toward the center, in the direction of the arrow, until they are wedged into a circle to make the assembly a tight fit. This fit is sufficient to prevent the segments from dropping out of the assembly when the ram and the base of the fixture are removed and the rings and material are handled by the operator as a unit.

To speed up the molding operation, three sets of assembly rings are made: one being used in the molding operation in the press; another, ready loaded, waiting for the mold to be released from the press; and the third being loaded with commutator segments in the assembly fixture by the operator or an assistant, in preparation for the hydraulic press. This procedure assures a continuous supply of loaded rings and reduces the cost of production.

These rings are kept heated to the approximate molding temperature in order to prevent drawing heat away from the mold, and also to avoid cracking the steel with sudden heat and when high pressure is applied.

Mold

With the segments formed into a ring in the special assembly fixture, the next operation is to move the ring assembly as a unit and place it into the mold as shown in Figure 4. Due to the shape and size of the product and the nature of the molding operation, the mold is loaded by hand and is designed to give the maximum speed in production for this type of compression molding.

The mold is made in four main parts consisting of a heavy base, a guide head, a ram, and a center piece.

Base

The mold base is made from machine steel and is square in shape with all the corners removed on the outside for convenience to the operator in handling the unit. The inside is bored to accommodate the outside diameter of the solid ring with plenty of clearance between the ring and the base. A knockout hole is provided at "A" to back out the center piece when repairs are necessary. At two corners of the base, heavy dowel pins are press fitted into holes bored all the way through so that the pins may be backed out if necessary. The other two corners of the base are tapped to receive the two assembly bolts.

Guide Head

The guide head serves two purposes: one to hold the commutator assembly and the split ring to the surface of the base; and the other is to guide the plastic mold into the exact position for the operation.

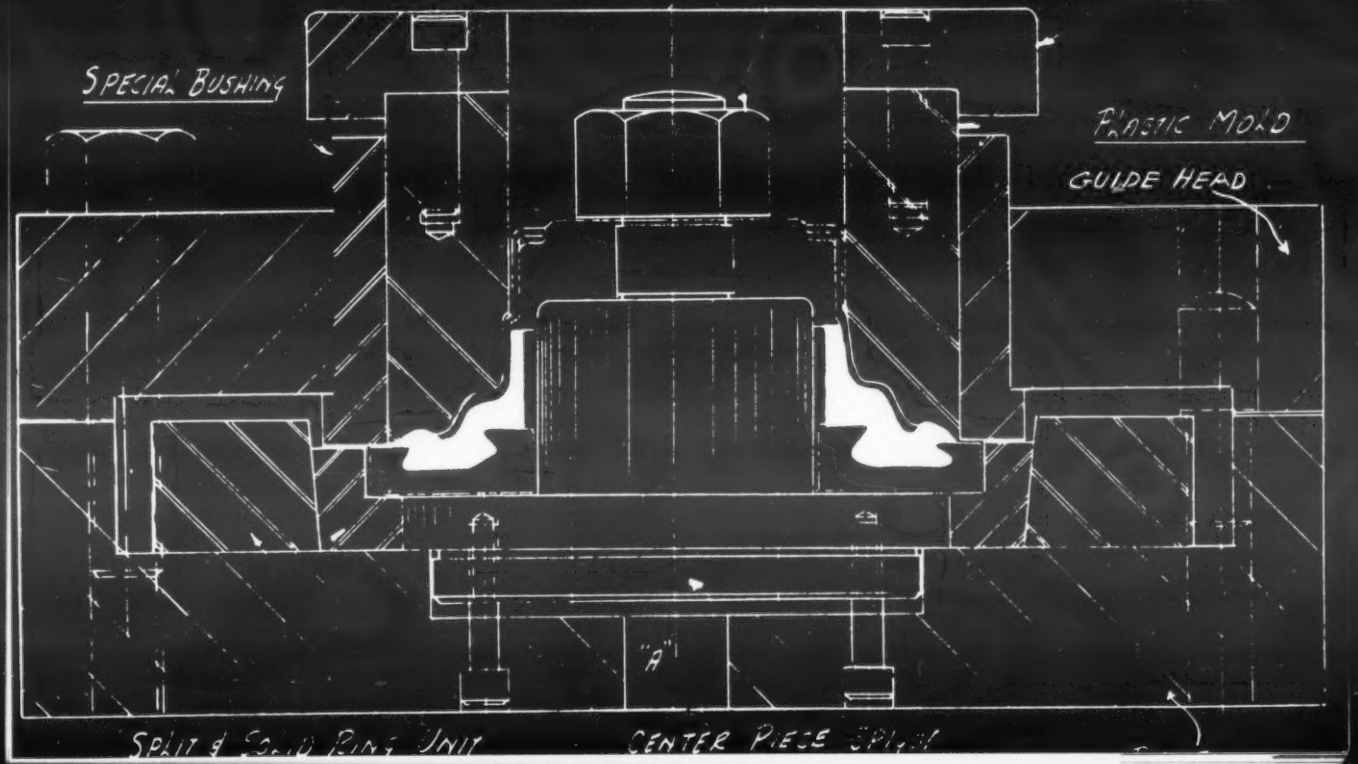
The shape of the guide head is square, the same as the base, and it has two holes bored to a sliding fit over the corner guide dowel pins. The other two corners have clearance holes for the assembly bolts to pass through the head.

The center of the head is bored to a 6½" press fit for a special bushing. The bushing is made of oil hardening tool steel, hardened and ground all over and accurately finished on the inside to a sliding fit with the mold. It is important that the bushing be a snug fit so that the mold will descend perpendicular to the center line of the die. Its accuracy prevents the plastic from escaping between the walls of the bushing and the mold. A shoulder is machined on the bushing and it is pressed into the underside of the head, becoming a part of the guide head. A large undercut is made on the inside of the head as a clearance for the large solid ring.

(TO PAGE 114—PLEASE)

FIGURE 4 CENTER PIECE AND CLAMP

FIGURE 4 CENTER PIECE AND CLAMP



Synthetic Rubber
From Test Tube To Assembly Line

Synthetic rubber from the test tube to the assembly line in the space of 18 months stands out as one of the most remarkable manufacturing achievements in the war. The production of this new rubber on a volume basis was a powerful blow to Axis hopes and demonstrated as forcibly as any other single action the resourcefulness of American enterprise.

In 1940 the country began to build up a stockpile of crude rubber, to conserve scrap rubber which had been going to Japan and to plan the production of synthetic rubber on a volume scale. When the Japanese struck at Pearl Harbor, the country had on hand about a year's supply of natural rubber based on peacetime consumption, a large supply of scrap and an aggressive reclaiming industry. The war in the Pacific shut off the importation of 95 percent of our natural rubber. The production of the remainder of the world was small and this must supply not only the United States but all allied nations.

The country's first line of defense was its stock of natural rubber, which had to be conserved. A nationwide advertising and publicity campaign educating the people in the proper methods of caring for rubber goods was inaugurated. Scrap rubber collection drives were put into effect and rubber manufacturers changed their formulas to process reclaimed rubber in place of crude in the making of military and essential civilian products.

The processing of reclaimed rubber could not hope to meet the growing demands of our armed forces for rubber and it was essential to develop as quickly as possible the new synthetic rubber industry. Building materials were difficult to obtain for the new synthetic rubber industry, and the number of new plants planned to develop it. The Government was putting up hundreds of developments which had higher priority ratings for steel and other essential metals. Those directing the synthetic rubber program overcame these handicaps by substituting wood and other less vital materials wherever possible without impairing the new structures. William M. Jeffers, president of Union Pacific Railroad System, was selected as the rubber coordinator to speed up this program.

There are five commercial types of synthetic rubber of the following identities and characteristics.

Buna

(1) The Buna S type, a copolymer of butadiene, and styrene. This type, the synthetic most similar to natural rubber in processing and performance characteristics, was chosen for the major part of the synthetic program. Buna S may be vulcanized with sulfur and rubber accelerators and cured to hard rubber. Its resistance to atmospheric deterioration is comparable to rubber but slightly higher. It may be used to replace rubber in most applications.

Buna N

(2) The Buna N synthetic rubbers are copolymers of butadiene and acrylonitrile. Although this type of synthetic rubber is similar to rubber in that it is vulcanized with sulfur and rubber accelerators, and may be cured to hard rubber, Buna N differs from rubber in other processing characteristics and in some operations is more difficult to handle. It has good resistance to oil but its light resisting qualities are poor.

Neoprene

(3) Neoprene is a polymer of chloroprene. Introduced by du Pont in 1932, neoprene was the first commercially successful synthetic rubber. Neoprene has proven itself as a good general purpose substitute for rubber with good resistance to chemicals and oils, and excellent resistance to heat, air and light, in fact, better light resistance than any other synthetic. An important quality of neoprene is its flame resistance, and for this

MOLD ESTIMATING CONTEST

Due to the fact that we received a large number of estimates just before the recent deadline in the contest on the Six-Cavity Stripper Plate Injection Mold (Pages 122-123 of January Issue) we were not able to announce the winning entries in this issue. We will publish the first prize entry in our May issue.

Reprints of the series of Thayer's "Estimating Plastics Molds" are now available as No. 3 of our Know-How Library. These are available at 35¢ each.

reason it is used as an outer sheath for electrical insulation, although its electrical properties are lower than those of natural rubber. This rubber cannot be broken down or plasticized by milling without the use of plasticizers, it does not require sulfur for vulcanization and cannot be cured to hard rubber.

Butyl

(4) Butyl rubber is a polymer of isobutylene and small quantities of other diolefines, such as isoprene or butadiene. Butyl rubber, according to present indications, can be produced at low cost quickly from abundant materials and can be used to replace natural rubber in many applications, although so far it has not exhibited the qualities of Buna S. Its processing characteristics are comparable to those of natural rubber but it has less adhesion and a much longer curing time. Butyl may be plasticized, vulcanized with sulfur and rubber chemicals, but cannot be vulcanized to hard rubber. Its resistance to deterioration is good, its resistance to oxygen and acid very good, but its physical properties are lower than those of natural rubber.

Thiokol

(5) The Thiokols of types A, B and FA differ in processing and performance characteristics from natural rubber and from other commercial synthetic rubbers. Thiokol RD is a Buna N synthetic rubber and should not be confused with this group. Generally speaking, the Thiokols have excellent resistance to deterioration, better resistance to aromatic hydrocarbons than rubber or other synthetic rubbers. They do not possess as high physical properties as natural rubber or other synthetics, particularly in resilience, tensile strength and resistance to cold flow, abrasion and extremes of temperature. Where resistance to deterioration is more important than physical properties, Thiokols have been successfully substitued for natural rubber.

Protection for Threaded and Machined Parts

Among the latest products of Precision Paper Tube Company, 2033 W. Charleston St., Chicago 47, Ill., are these convenient internal and external safeguards for threaded and machined parts.

These Thread Protectors and Dust Caps are made of spiral-wound fibre, kraft paper, or cellulose acetate, under heat-treated compression. They are designed and constructed for greatest durability in protecting fittings, exposed openings and ends, tubing, and many other similar products, from moisture, rust, dirt, grit, dust or damage in packing, storage or shipping.

The protectors are specially shaped for the article to be safeguarded, and can be made in cylindrical, square, rectangular, tapered, crimped or flared shapes, with or without perforation, to tolerances as close as .003". The name of the part which the protector fits, as well as the name of the manufacturer, can be printed in the protector.

INFORM-A-GRAM KEY No. 86-X

Close Tolerance Groove Tooling

(CONTINUED FROM PAGE 97)

these methods is to use mechanical pressure bolts through slots in the flats. However, this type of assembly is prone to "creep" with continual use and very accurate adjustments must frequently be made. Another method is to assemble the flats with an accurately ground vise on a surface plate. The edges of the flats are beveled and then tacked with silver solder. The silver solder spelter is removed by scraping or grinding. This type of permanent block permits the removal of a dulled tool without disturbing the rest of the tool setup.

As much accuracy must be built into the block in either case as is expected in the finished groove. If a top rake is indicated by the material to be machined, this top rake should be built into the block itself rather than on the tool.

The regrinding of the grooving tools must be a precision operation. To sharpen, only the front relief is ground thus maintaining the established width of the tool. If single tools are reground, the face of the grind must be held to very close tolerances due to the fact that a slight angle will cause the tool to "lead off". If a permanent magazine block is used and the depth of the grooves is constant an entire block of tools may be ground in one setting on a surface grinder. Fixture grinding on a production job has been proved very satisfactory.

"Lubricoolants"

Experiments in grooving to tolerances of plus or minus .0002" have shown that the grooving tool should be .0001" to .0002" below the low limit of the width desired. If a tool is cutting slightly oversize, the addition of a sulphonated base oil to the lubricant will tighten up the cutting action. Aluminum, bronze and brasses groove well by using a kerosene and base oil lubricant in the ratio of about 10 to 15 parts kerosene to 1 part base oil. Cast irons respond to emulsified oil and water combinations in the ratio of 20 to 1. Steels seem to groove better with a 7 to 10 parts mixture of sulpho-chlorinated base oil with 100 saybolt viscosity paraffin base oil.

Feeds and Speeds

Feeds and speeds are problematical due to equipment and the material to be machined. However, if the equipment can accommodate high speeds, the writer recommends a very high surface speed for all grooving operations. The nonferrous metals can be machined with the carbides at surface speeds of approximately 1000 SFM. Steel and cast irons will respond to approximately 300 to 500 SFM in grooving operations. The writer cautions the reader that it requires exceptional equipment to attain these speeds without destructive vibration.

In conclusion the writer wishes to state that this article is not meant to portray a panacea for all grooving problems, but is written as a summary of data which may prove useful in attacking specific applications.

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Selecting Carbides for Milling

(CONTINUED FROM PAGE 100)

into two groups since many present day irons approach steel in machining characteristics. "Steel cutting" grades of carbides frequently give better results on malleables than do the straight "iron cutting" grades. There is quite a similarity here to the recommendations for the finish milling of steels.

In this group are included those irons with hard spots or hard sections, inasmuch as such sections frequently control the selection of the carbide by making *toughness* rather than *abrasion resistance* the limiting factor as regards tool life.

For milling the simpler cast and malleable irons, *abrasion resistance* is usually the limiting factor as to tool life. Straight tungsten carbides are usually considered best for this work. Where work sections are particularly rough, the tougher grades of straight tungsten carbides provide somewhat greater life. On smoother castings and for taking finishing cuts, the more abrasion-resistant grades of straight tungsten carbides will usually give longer tool life and a flatter finish.

For most aluminum milling, straight tungsten carbides usually work out best. These grades provide a high degree of resistance to the abrasion caused by the

(TO PAGE 114—PLEASE)

INDUSTRIAL DIGEST

SCIENCE • RESEARCH • METHODS • TOOLING
PRODUCTION • TRADE NEWS AND REPORTS

Spectroscopic Analysis of Metals

Traditional chemical methods of analyzing metals are yielding to the more modern spectrographic technique. Though the spectrographic method has existed for some years, it has been made more effective recently as wartime demands grew in volume and necessitated a speedier, less costly procedure to analyze metals.

The spectroscope, which decomposes a beam of light, or radiant energy, into its constituents, has solved many problems created by war activities. The spectrographic technique is now standard for aluminum and magnesium alloys and many steels. Spectroscopy can accomplish an accurate analysis in many instances where chemical methods are not sufficient.

For example, it has been established that a concentration of about two hundredths of one percent tin is harmful for many steels. With the increased use of scrap such a tin content is not uncommon. A chemical analysis to determine the tin content requires about eight hours while a spectrographic analysis is made in less than ten minutes. Obviously, the latter can be made while the furnace is waiting.

Another example is found in magnesium alloys. A calcium content of about one tenth of one percent destroys the usefulness of many such alloys, and because of the great chemical similarity between calcium and magnesium there is no chemical method for detecting such amounts of calcium. The spectrograph accomplishes this without difficulty.

The Metals and Minerals Branch of the Office of Production Research and Development, a part of the War Production Board, supervises and coordinates research on metals and minerals for WPB. This office has taken a leading part in development of spectrographic analysis. The branch works mainly through the War Metallurgy Committee, organized by the National Academy of Sciences, under contract with WPB. This committee includes many of the leading specialists from industrial and university laboratories throughout the country.

Dr. G. H. Dieke, professor of physics at Johns Hopkins University, with but two assistants, has done a notable part of the research needed to bring spectrographic analysis to its present usefulness in the analysis of metals. His laboratory has become the mecca for production specialists from all over the country.

Dr. Dieke has visited many industries where spectrographic methods are used. When certain problems were encountered in individual plants which required special study and development, the laboratory at Johns Hopkins in Baltimore was used to provide a solution. Dr. Dieke's headquarters cooperated with industrial laboratories in expediting snags in wartime metal production.

"Spectrographic methods are relatively new and fairly complicated in their general background," Dr. Dieke said. "They can, however, be systematized so that they can be used by relatively unskilled workers. This presupposes that the methods have been worked out in a research laboratory with a specially-trained staff and the various possibilities and sources of error investigated in every case. Such a procedure will save a great deal of personnel, particularly persons with specialized training who are almost unobtainable now."

Applications of Plastics

(CONTINUED FROM PAGE 108)

The center piece is designed to locate the segment unit and all the parts which make up the assembly of the commutator within the center of the mold. It is made of two pieces, an upper and a lower part, which are assembled together with cap screws and dowels. The upper part is machined to the inside contour of the commutator head and is threaded on the end for a clamping nut. The lower part is made large enough in diameter to allow the circle of segments to rest on its surface. To accurately locate the center piece, a spigot is machined and then hardened and ground for a press fit into the bore in the base where it is held permanently in position.

Mold Ram

The mold ram is primarily designed to squeeze the plastic into the shape shown in solid, Figure 1. Oil hardening steel is used for the mold, the outside diameter of which is ground to suit the accurate bore in the bushing. The inside diameter is machined to slip over the commutator reinforcing ring shown in Figure 1. The end is ground and highly polished to blend into the reinforcing ring and also to mold part of the plastic contour as shown in Figure 4. The opposite end of the mold is machined to fit into the machine steel ram head which is counterbored to receive it. A large hole is machined in the center as a clearance for the clamping nut and both parts are assembled and held together by four standard cap screws. The machine steel plate on top of the mold provides protection from wear on the mold and gives a larger area for the ram to be pressed into position by the hydraulic press. All the parts of the mold are designed to withstand repeated shocks, at heating temperatures, by the operation of the press.

Molding Operation

In preparation for the molding operation, the guide head and the ram are separated from the base. The segment unit is loaded into the bore in the base, the ring locating the unit centrally, and the segments resting on the center surface. All the commutator parts are then assembled around the center piece in the order indicated in Figure 1. The clamping nut is tightened to hold all the parts rigidly in place. The guide head is then mounted on the base, properly located by the two dowel guide pins and held by the corner clamping bolts. The plastic powder, having been properly weighed to give the exact amount to complete the operation, is poured all around the inside of the guide head bushing and spread as evenly as possible by the operator, after which the ram is assembled into the guide bushing. The mold is then placed on the table of the hydraulic press and the ram of the press is brought down upon the mold ram to force the plastic into the contour of the segments and up into the commutator ring. The area taken up by the plastic material when finished is shown in Figure 4. The pressure required to mold this particular commutator ranges from 4,000 to 4,200 psi. The plastic is then allowed to cook for a period of seven minutes at a temperature of 300° F, plus or minus 10°.

It will be seen in Figure 4 that the segments are entirely enclosed on every side by the various parts of the mold. This is to prevent them from changing their position under the heavy pressure from the press. The two clamping units hold the mold components firmly in place to prevent the pressure of the plastic from separating or distorting the commutator parts.

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Selecting Carbides for Milling

(CONTINUED FROM PAGE 112)

aluminum oxides and other abrasive materials included in many aluminum alloys.

In some aluminum milling, such as form milling, formation of a built-up edge on the tool may cause trouble. Addition of a slight amount of tantalum to the carbide helps to resist the build-up.

Other Materials

On other non-ferrous metals and nonmetallic materials a straight tungsten carbide usually gives best results inasmuch as in most of these materials the most important carbide qualities called for are ability to resist abrasion and wear and ability to take and maintain a keen cutting edge.

Only three years ago, Cooper-Bessemer introduced cast-to-shape Meehanite tool shanks for shops equipped to do their own tipping. These tools have proved both their superiority and economy so convincingly that the "family" now has been enlarged to include face mills, side mills, and shell end mills, each in a wide range of sizes and in proper designs for machining iron, steel, plastics and all non-ferrous metals.

If yours is one of the hundreds of shops using Cooper-Bessemer Meehanite shanks, you are well aware of their unique advantages. But whether or not you are already a user, you now can obtain these same advantages with our additional cutting tools . . . superior vibration damping . . . better heat dissipation . . . faster, cleaner cutting . . . longer tool life . . . in short, a step-up in production plus a big overall saving in cost!

Write, specifying the size and type tools you need, and get complete information with prices. Or, if you prefer, just describe your work in detail. Cooper-Bessemer is well prepared to give technical advice on speeds and feeds for cutting all materials. There's no obligation whatever.

All tools are available either right or left hand in a full range of designs for cutting iron, steel, plastics, and all non-ferrous metals. All tools are cast to shape minimizing machining.

FACE MILLS From 4 to 12 inches in diameter in 1" steps.

SIDE MILLS From 3 to 8 inches in diameter in 1" steps, and in several cutting widths. Far easier to machine than steel, they are readily used in combination as staggered tooth or slotting cutters.

SHELL END MILLS From 2 to 6 inches in diameter in ½" steps.

TOOL SHANKS Usual standard shapes. Special shapes produced on order.

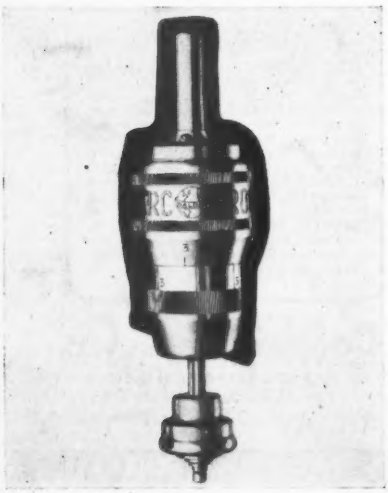
SPECIAL PURPOSE TOOLS Forming tools and special tools of every description are regularly cast to shape.

THE
Cooper-Bessemer
CORPORATION
Industrial Tool Division
Dept. J, Mount Vernon, Ohio

TOOLS ARE WEAPONS---TREAT 'EM RIGHT

PROGRESS ON PARADE

THE ROUGHNESS METER developed by the Physicists Research Co. provides measurements of average roughness on relatively coarse surfaces such as those of high-explosive, large-caliber shells. Readings are directly in microinch average roughness of the surface being measured. The meter and the scale selector provide full scale ranges of 300, 1000 and 3000 microinches. The Tracer, designed for hand operation, is ruggedly built for use on rough shell surfaces and has a blunt diamond point for tracing the surface. The diamond point is automatically self-adjusting to any curvature from 1½" OD to flat. Because of the importance of the shell production program, the manufacturer is offering to demonstrate the Roughness Meter at the plant of any firm producing shells. For further information and to arrange a demonstration, address PHYSICISTS RESEARCH CO., Dept. 9, Ann Arbor, Mich.
INFORM-A-GRAM KEY No. 773-X

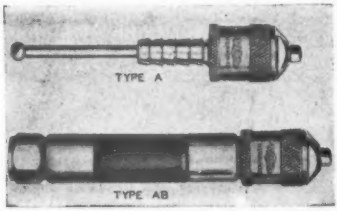


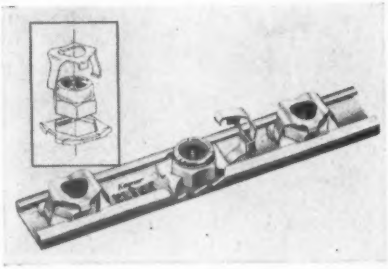
INTERNAL GROOVING TOOL. The new Waldes Truarc Grooving Tool for cutting internal grooves in bores or housings can be used in any ordinary drill press, turret lathe or boring mill speedily and accurately even by unskilled labor. The tool operates smoothly by a fingertip pressure. Recesses can be spaced from either top or bottom by sliding the movable head forward or backward. Diameter of groove is controlled by turning the upper knurled section. Positive non-slip drive is obtained because cutters have a tapered spline hole fitting a tapered cutter shaft. Correct size bushings and cutters are self-contained. The compact design of the Truarc assures a minimum of overhang between cutter and the drill press or lathe bearings. This tool is the product of WALDES KOH-I-NOOR, INC., Dept. T, Long Island City 1, N. Y.
INFORM-A-GRAM KEY No. C85-X

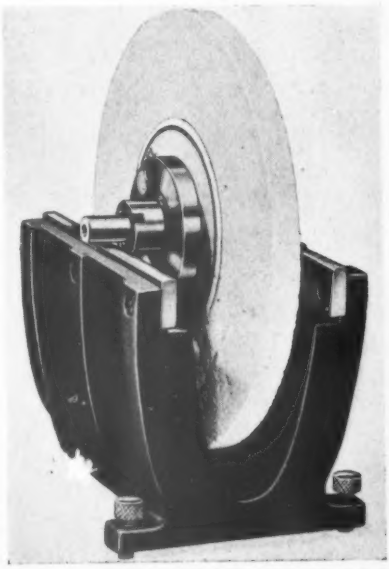
THE LEAK-PROOF AIR GUNS now being produced by Trico Fuse Co. are used for blowing chips, dust, dirt, kicking out finished parts, etc. The air is discharged in a puff or full blast, as desired, by a slight "fingertip" flex of the hose. The gun's instant and positive action and simple design (only two moving parts) effects substantial savings in maintenance cost. Its streamlined design eliminates protruding levers or buttons, making it easy to reach "hard-to-get-at" places. The Leak-Proof Air Guns are available in three styles and for a complete range of hose diameters. Type "A" is the most popular style for permanent applications. Type "AM" is a midget model intended for small, light work only and Type "AB" is a Type "A" gun assembled on a short length hose having standard female pipe fitting. This style is recommended for remote control applications. It is attached directly to the air pipe line and is operated by hand, knee or foot control, treadle, pulleys, cams, plungers, etc. Bulletin No. 40 fully describing the Trico line of Leak-Proof Air Guns will be sent by TRICO FUSE CO., Dept. TD, Milwaukee 12, Wis.
INFORM-A-GRAM KEY No. A78-X

NUT AND BOLT RETAINER. The new design of the "Click" gang channel nut and bolt retainer has resulted in an over-all width reduction of 10% over previous models, making it equivalent to existing engineering standards. Another improvement increases the bearing surfaces and retaining strength of the channel flange. The unit consists of a retainer plate held by the flanges of the channel in which a standard nut or bolt fits. A steel spring clip fits over the nut or bolt head and grips the retainer plate. Assembly is accomplished by simply snapping the spring clip into position. Disassembly to permit fast change of damaged nuts or bolts is accomplished by opening the spring clip with a screw driver. "Click" gang channels are fabricated from 24-ST Alclad Aluminum and may be riveted or spot welded to other assembly components. The nut or bolt can "float," insuring self-alignment of nuts with the bolt axis and preventing cross-threading in the event bolts enter the nut channel at a slight angle. Nut channels are available to accommodate sizes 6-32 through $\frac{1}{16}$"-24. Full engineering and cost data is available upon written request on company letterhead to: KAYNAR MANUFACTURING CO., Engineering Dept. 1A, 818 E. 16th St., Los Angeles 21, Cal.
INFORM-A-GRAM KEY No. C94-X

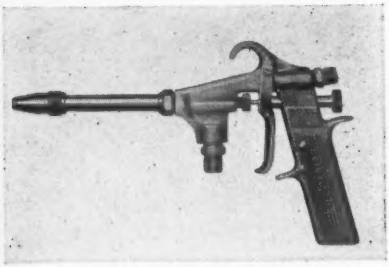
A BALANCING STAND with arbor, made by The Taft-Peirce Manufacturing Co., will insure the proper balancing of surface grinding wheels up to 7" in diameter. The base is cast iron and two hardened rails are provided on which the balancing arbor may roll freely to indicate the balance of the mounted wheel. For illustrated literature describing this balancing stand, write THE TAFT-PEIRCE MFG. CO., Dept. TJ, Woonsocket, R. I.
INFORM-A-GRAM KEY No. 484-X

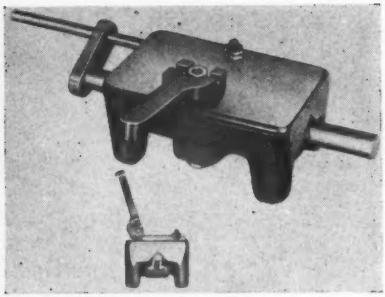






THE NEW PRESSURE-FEED SPRAY GUN manufactured by The DeVilbiss Co. has been designed for industrial degreasing and cleaning operations on castings, forgings, sheet metal, etc. It operates from a pressure feed tank and handles all kinds of commercial solvents and cleaners, producing a heavy, driving, but well atomized spray that speedily removes dirt and grease. The rate of fluid flow can be controlled either by adjusting the pressure on the material tank or by regulating the fluid adjustment at the rear of the gun. The gun body, made of a tough, durable alloy, is exceedingly light in weight and shaped to fit the hand comfortably and naturally. It has a two-finger, easy-to-pull trigger designed to reduce hand fatigue. By pulling this trigger part way back, air alone is emitted from the nozzle, thus permitting the gun to be used as a duster and for drying. Air consumption is 8 cfm at 50 lbs pressure. THE DeVILBISS CO., Dept. D, Toledo 1, Ohio.
INFORM-A-GRAM KEY No. 267-X





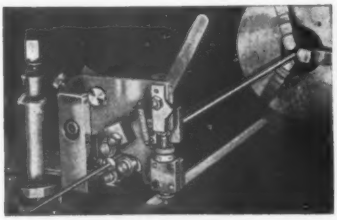
PARLEC DRILL JIGS for round stock are now available in three sizes known as the Model R Series. The Model R-20 will handle stock ¼" to ½" in diameter, Model R-40 is for ½" to 1" stock and the Model R-60 for 1" to 2" stock. These drill jigs are made ready for operation by adding the necessary bushings, adjusting the equalizing clamp, setting the lock nuts to the size piece to be drilled and locating the adjustable stop furnished with each jig. By installing a pin in the jig, a stop is thereby provided for drilling pieces shorter than the jig body. In cases where a longer stop than that furnished with the jig is required, standard diameter bar stock is used to attain the necessary extension. The body, equalizing clamp and handle are fabricated from a nickel-iron alloy and are normalized. The body of the fixture and the equalizing clamps are precision ground top and bottom and the ends are finished. The center of the 30° stock retainer in the clamp is precision finished in the R-40 and R-60 Models. Manufactured by UNIVERSAL TOOL CO., 919 E. Redondo Blvd., Inglewood, Calif., who will send engineering details by request made on company letterhead.
INFORM-A-GRAM KEY No. C75-X

TWIN READER is a new type hand magnifier which incorporates scientifically matched and balanced dual lenses mounted in a holder which folds back into a compact and attractive plastic handle. The Twin Reader, designed to be held in viewing position with either hand, permits the examination of objects greatly magnified with the clarity of normal third-dimensional vision or true depth perception with freedom from distortion and aberrations. Although it can be used in conjunction with corrective glasses, this instrument is not designed to take the place of corrective glasses but merely to provide magnification and sharper binocular vision. Initial production is in focal lengths of from 8" to 14" and three different powers of magnification. When folded, it is the size of the average spectacle case. The Twin Reader is a product of EDROY PRODUCTS CO., 480 Lexington Ave., New York 17, N. Y.
INFORM-A-GRAM KEY No. D13-X

TURNTHREAD ATTACHMENT. The greatly improved Micro-Turnthread attachment for engine lathe work can produce a variety of turned and knurled parts with the speed and accuracy approaching that of a screw machine. This unit, manufactured and sold exclusively by the MELLING TOOL CO., Dept. TD, Jackson, Mich., is self-contained and all parts are securely mounted on one solid yoke. Two models, "A" and "B", are available. Model "A", for turning long shafts and cutting National Acme threads, is constructed with rollers at the right of the cutting tool. This permits any length of stock to be turned perfectly true even if it was not true when beginning the cut. The cut is started at the tail stock end where the work is solid on the center and is allowed to run far enough that the top and back roller may be adjusted by knurled adjusting screws until they run on the work. This model is manufactured in two sizes, No. 1 to handle diameters from ⅛" to 1" and No. 2 for ½" to 2" diameter stock. Since Model "A" does not have removable tool holders, it is arranged for securing the tool-bit in the tool arm. Model "B" features the quick change, self-locking tool holders. A change of holders may be made in the brief time required to lift one from the locking-post and place another in position. The thrust of the cut locks the holder firmly in place and it can be easily freed for lifting off by rotating it away from the backstop. Size No. 1 in Model "B" handles stock ⅛" to ⅞" diameter and No. 2—½" to 1¾". Additional information and descriptive literature are available.
INFORM-A-GRAM KEY No. D8-X

A NEW TELESCOPE GAGE especially designed for use in the Automotive Industry has been announced by the BRAND TOOL & SUPPLY CO., Dept. J, Flower at Washington, Los Angeles 15, Calif. The measuring capacity of this telescope gage is from 2½" to 4½" and it is equipped with a handle 9" long. The two measuring points are hardened and ground to the proper radius. The entire gage is highly finished and the handle that actuates the plunger is knurled and of ample size for easy gripping. Brand Tool & Supply Co. will send detailed information on the Automotive Telescope Gage on request.
INFORM-A-GRAM KEY No. A41-X

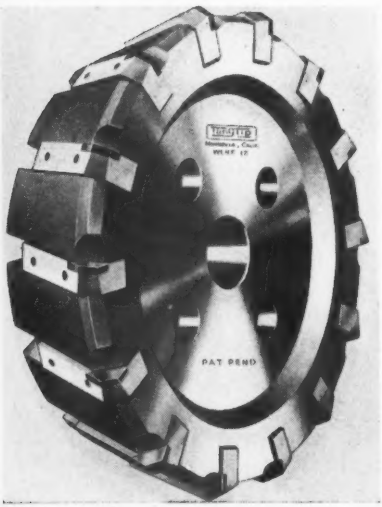
AN AUTOMATIC DRILL PRESS ATTACHMENT for handling drills from No. 55 to ¼" diameter has recently supplemented The Automatic Drill Press Co.'s line of automatic machinery. This illustration shows an installation for drilling two $\frac{3}{32}$" diameter holes in a mortar shell fuze part. With this attachment holes can be held to close depth tolerance. The operator's hands are free to index the jig, load and unload the part. The forward and reverse movement of the drill spindle is entirely automatic and is set in motion by the foot switch which closes the motor circuit contactor. All belts, gears, etc., have been eliminated and the drill spindle is directly connected to the motor. The unit can be clamped to any standard press column. An illustrated 4-page folder will be sent on request by AUTOMATIC DRILL PRESS CO., Dept. D, 14899 Lesure Ave., Detroit 27, Mich.
INFORM-A-GRAM KEY No. D40-X



ADJUSTABLE WORM DRIVE HOSE CLAMP incorporated in the new worm drive hose clamp of the Wittek Manufacturing Co. is an inner band of stainless steel which protects the hose from the serrations in the outer band and distributes the load uniformly to provide greater strength and superior sealing characteristics. The hose clamp has a compact, streamlined housing and a hardened one-piece thumbscrew. The clamp is available in eight adjustable sizes to cover the entire range of applications. This improved worm drive hose clamp, known as Type WWD, is made by WITTEK MANUFACTURING CO., Dept. J, 4305-15 W. 24th Place, Chicago 23, Ill.
INFORM-A-GRAM KEY No. 622-X

A MASTER DIAMOND CHECKING SET for inspecting the accuracy of hardness testing equipment has been developed by CLARK INSTRUMENT, INC., Dept. T, 10200 Ford Rd., Dearborn, Mich. The set consists of a gold-plated diamond penetrator and two test blocks. Since the penetrator was designed to be used only for checking purposes, it is made to exceedingly close tolerances to give highly accurate measurements and retain this accuracy for a long period of time. When checking, the master diamond penetrator releases the regular penetrator in the machine. The master test blocks are likewise held to extremely close limits and are used only in connection with the master diamond, resulting in a very accurate check of the machine, either as a periodic measure or whenever readings may be in doubt. The Clark Master Diamond Checking Set is furnished ready for use in a fitted case. Clark Instrument, Inc., will send further details.
INFORM-A-GRAM KEY No. 120-X

THE INSERTED-TOOTH MILLING CUTTER developed by the Tungtip Tools Division of Lowell & Grayson consists of carbide tipped tool steel inserts rigidly locked into the tool body without extraneous parts. The inserts are provided with a precision flat back and serrated front face, assuring uniform clamping pressure over the entire length of the insert. This rigid locking maintains the blade in correct position regardless of cutting pressure. Rough grinding of the inserts is eliminated by a screw mechanism which adjusts the inserts to within .003". Tungtip Cutters are available in Face Mill and Half-Side Mill styles. The alloy steel body of the Face Mill is accurately counterbored in the back of the cutter providing a ground surface for accurate location on the outside of the spindle nose of the milling machine. Half-Side Mills are provided with a precision ground arbor hole and hub faces for accurate alignment for straddle milling operations. Both types are available with carbide teeth ground with corner angle or may be had with inserts ground to 90° corner for milling to a shoulder. For detailed information, address TUNGTIP TOOLS DIVISION of Lowell & Grayson, Dept. TDJ, Monrovia, Calif.
INFORM-A-GRAM KEY No. D41-X



Ground Multiple

THREAD MILLING CUTTERS

by Continental

A Shell-type cutter with margin on each end
B Modified Acme thread form cutter
C Thread cutter button for Hall Planetary machine
D Shank-type cutter
E Shank-type two-diameter cutter
F Small diameter shank-type cutter with adapter
G Shank-type cutter

for fast, accurate production

Over 20 years' experience in precision thread grinding is built into CTW ground thread milling cutters . . . CTW ground thread milling cutters maintain dimensional accuracy on long production runs throughout the entire life of the cutter . . . Available in both shank and shell type, in National, Whitworth, Acme, V and special forms of thread. Many popular sizes carried in stock . . . For high production thread milling at lower tool cost, use Continental (CTW) ground thread milling cutters. Write to Continental today.

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

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CTW

Continental

CUTTING TOOLS

Boring Bars and Tools

Broaches
Broach Pullers
Broaching Fixtures

Core Drills

Counterbores and Countersinks

CTW Drive Holders

Counterbores (Tool Room Sets)

Counterbore Pilots

Inserted Blade Cutters

Carbide Tipped Cutters

Form Relieved Cutters

Milling Cutters

Thread Milling Cutters

End Mills

Side Mills

High Speed Steel Reamers

Carbide Tipped Reamers

Shell Reamers

Inverted Spotfacers

High Speed Steel Tool Bits

Carbide Tipped Tool Bits

Circular Form Tools

Cut-off Tools

Flat Form Tools

Dovetail Form Tools

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THE QUADRILL, a four position turret drill head, is pictorially described in a 4-page folder issued by the CHICAGO DRILLET CORP., Dept. T, 919 N. Michigan Ave., Chicago 11, Ill. This drill press attachment is ideal for drilling, counter-boring, counter-sinking, reaming, spot-facing and many other drill press operations. One tool only is in motion when the head is in operating position.
INFORM-A-GRAM KEY No. B34-X

STEEL STAMPS which have heavy-duty steel letters and figures are featured in Bulletin 106 recently published by THE ACRO-MARK CO., Dept. T, 5-15 Morrell St., Elizabeth, N. J. These stamps are extensively used in machine shops, foundries, tool plants, instrument and aircraft manufacturing plants, steel mills and automotive equipment factories. Engraved with a strong heavy bevel for maximum strength; marking bites or impressions are practically limitless with these strong, durable units. A tapered and rounded head prevents peeling and dangerous chipping under impact. Each stamp is of extra length and body—oversized to fit the hand and eliminate "shivering" at each heavy blow.
INFORM-A-GRAM KEY No. 636-X

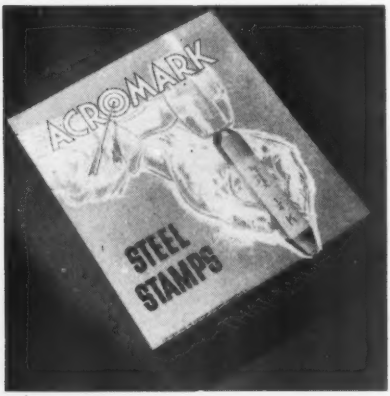


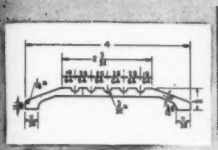
PLATE SET SYSTEM for punching sheet metal is explained and illustrated in the 2nd Edition of Catalog PS released by the WALES-STRIPPIT CORP., Dept. TJ, 345 Payne Ave., N. Tonawanda, N. Y. The Wales Plate Set System is made up of Plate Sets, Punch Assemblies and Dies, and Adjustable Feed Carriages. These parts may be quickly assembled into a die to punch to any required hole punching pattern. Seven steps in the making of these plate set assemblies are illustrated and described.
INFORM-A-GRAM KEY No. 60-X

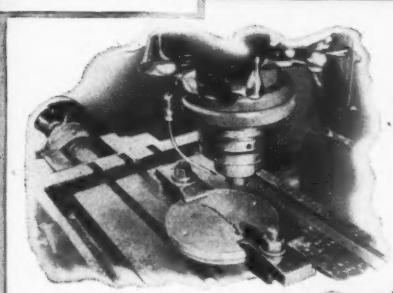
HYDROILIC PRESSES are featured in a 30-page illustrated booklet published by the DENISON ENGINEERING CO., Dept. T, 1197 Dublin Rd., Columbus 16, Ohio. Charts showing engineering facts and figures are included along with diagrams, specifications and illustrated descriptions of their various models of presses. The SA2 Open-Side Presses, available in 25 and 50-ton capacities, are ideally suited to a wide range of straightening, assembling and pressing operations on either small-lot or volume-production work.
INFORM-A-GRAM KEY No. 260-X

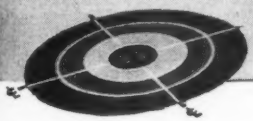
GRANITE SURFACE PLATES are described in a 4-page illustrated folder issued by the HERMAN STONE CO., Dept. T, 324 Harries Bldg., Dayton 2, Ohio. These precision surface plates are practically indestructible. Heavy or pointed objects accidentally dropped on the surface will not impair its accuracy. The necessity of demagnetizing any material before testing is eliminated on this type of surface plate. The plates will not rust, corrode or warp and they are finished to 1/10,000" over all.
INFORM-A-GRAM KEY No. 669-X

"SUPER-SPEED" PNEUMATIC GRINDER, Model SS-SR, of steel construction throughout and designed to get into deep cavities and hard-to-get-at places, is described in Bulletin 1001 available from M-B PRODUCTS, Dept. J, 130-134 E. Larned St., Detroit 26, Mich. The air is controlled by a positive quick acting valve, one half turn of which turns it completely on or off. Patented dirt filter in hose

Would You Need More than 10 hours To Mill this Extrusion Die ?







The speed and accuracy with which this extrusion die was milled is unusual — but it's typical performance for a Milwaukee Rotary Head Milling Machine — the most versatile machine ever designed for die and mold work. *Read this job report:*

Material . . . High Vanadium — High Speed Steel

Operation . . . machine orifice of extrusion die.

Time Distribution . . . set up, ¼ hour; layout, ¼ hour; rough mill outline, $\frac{7}{16}$" deep, 2 hours; rough drill opening through die, 1 hour; finish mill outline, $\frac{7}{16}$", 2½ hours; square cut corners with slotting attachment, ¾ hours; mill lead side of die, 3¼ hours; **Total Time** — 10 hours. No templets were required.

Check these advantages of the Milwaukee Rotary Head Mill Machine and how you can benefit from them in your own shop:

DIRECT — mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE — no changes in set-up eliminates chances for error. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

FAST — initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of the intricate molds and dies is the result. Write for Bulletin No. 1002C and complete information.

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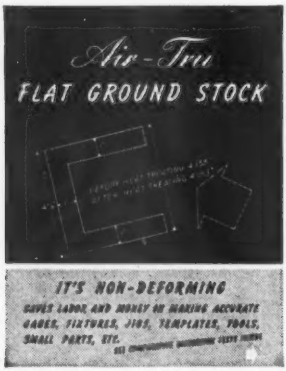
protects all working parts from foreign matter in air lines. Handles grinding wheels, cutters, rotary files, etc., with either ⅛" or $\frac{3}{16}$" diameter shanks. Tool post adaptors are available as extra equipment.
INFORM-A-GRAM KEY No. A86-X

"PROCESSING CARRIERS" CATALOG, published by ROLOCK, INC., Dept. TD, 1350 Kings Highway, Fairfield, Conn., should be of interest to manufacturers whose products or metal parts are subject to various finishing processes. This 24-page edition pictures and describes more than one hundred custom-built metal baskets, trays, crates, barrels, boxes and fixtures that have been designed to solve specific problems for better handling and processing of metal parts. The carrier descriptions and specifications are sectionalized under Heat Treating with all its various processing operations, Fixtures, Pickling Equipment, Plating and Finishing and Metal Tanks, and under design types of carriers.
INFORM-A-GRAM KEY No. D20-X

AIR HARDENING FLAT GROUND STOCK—A truly non-deforming flat ground stock called "Air-Tru" is now available to assure highly accurate jigs, gages, fixtures, tools, punch and die facings, and small precision parts. It offers a real opportunity to save time and money on precision work. This unique high quality


Air-Tru
FLAT GROUND STOCK
IT'S NON-DEFORMING
SAVES LABOR AND MONEY IN MAKING ACCURATE GAGES, FIXTURES, JIGS, TEMPLATES, TOOLS, SMALL PARTS, ETC.

steel is a development of SIMONDS WORDEN WHITE CO., Dept. T, Dayton, Ohio. "Air-Tru" Flat Ground Stock is available in all standard stock sizes. Its ability to hold close tolerances through heat treating is graphically illustrated in a new folder available on request.
INFORM-A-GRAM KEY No. D37-X

HAMMERS—Plastic and Metocraft Soft Hammers are described in two illustrated folders published by INDUSTRIAL PRODUCTS SUPPLIERS, Dept. D, 2 Broadway, New York 4, N. Y. Artus Red-Hed Plastic Hammers are recommended for work on all highly polished surfaces and fine lapped finishes, and on delicate parts requiring precision fit. The All-Plastic surface (no metal exposed) eliminates all risk of marring metal surfaces. Metocraft Hammers are available in soft, medium or hard grades of non-ferrous metals. Hickory or steel handles are available.
INFORM-A-GRAM KEY No. 594-X

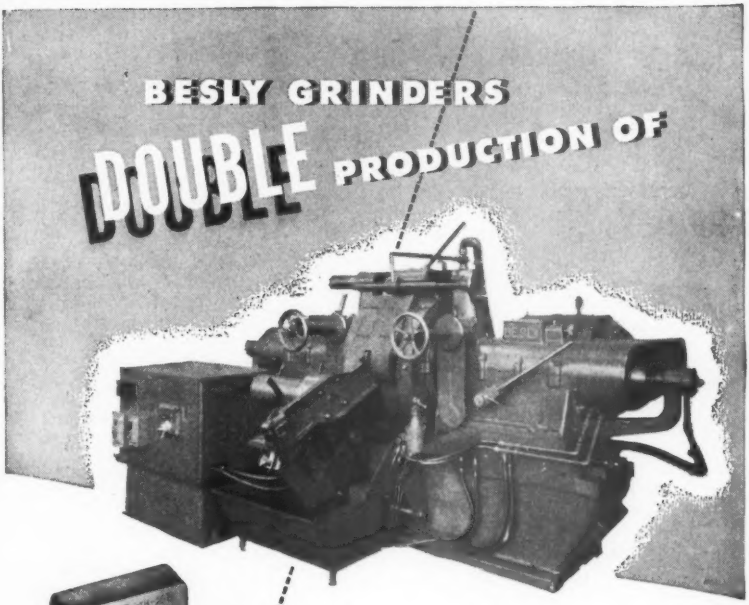
GRAND RAPIDS DRILL & TAP GRINDERS are discussed in an informative bulletin, GI 9-15, published by the GALLMEYER & LIVINGSTON CO., Dept. D, 304 Straight Ave., Grand Rapids, Mich. The conditions required for a perfect working twist drill are given along with information on the constructional features of these tools. Illustrations of various models of drill and tap grinders are included with specifications. An interesting discussion is devoted to helpful hints regarding the care and use of twist drills.
INFORM-A-GRAM KEY No. 625-X

PRECISION TWIST DRILLS & WATCHMAKERS FLAT DRILLS—A new circular has recently been published by WHITMAN & BARNES, Dept. TD, 2108 W. Fort St., Detroit 16, Mich., which illustrates and lists Hercules Precision Twist Drills and Watchmakers (Flat) Drills. The former are made with spiral flutes. The latter have straight flutes and are often referred to as 'Flat" drills. Drill diameters regularly made and carried in stock range from .15 M/M to 1.00 M/M (.0059" to .0394"). Both types of drills are furnished in two styles of shank, straight shank and oversize shank. Special diameters as well as special designs to suit individual applications can be furnished to customers' blueprints or specifications.
INFORM-A-GRAM KEY No. 502-X

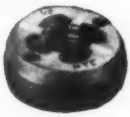
PRECISION FACILITIES offered by the ACE MFG. CORP., Dept. T, 1217 E. Erie Ave., Philadelphia 24, Pa., are featured in an 8-page booklet issued by the company. They are equipped to perform all operations in the manufacture of punches and dies for small intricate metal stampings, and of jigs, fixtures, gages, molds, flat and circular tools for automatic screw machines, and tool bits. Precision grinding, production machining, metal stamping, heat treating, tool and die work and precision aircraft, radio, instrument and machine parts are the departments discussed.
INFORM-A-GRAM KEY No. 136-X

THE ABC OF ELECTRONIC HEATING is the title of a 16-page booklet written for both engineer and manufacturer on the subject of electronic heating and published by the Scientific Electric Div. of "S" CORRUGATED QUENCHED

BESLY GRINDERS DOUBLE PRODUCTION OF



NYE PIPE DIES



● Again, Besly engineers have rung the bell in designing a production grinder—this time for the Nye Tool and Machine Company. Nye's problem was to step up their output of pipe threading dies without sacrifice of quality in the accurate grinding of parallel surfaces.

With the features of the Besly No. 226 double-spindle grinder as the basis, the grinder, illustrated above, was developed to grind relatively large areas—dies up to 5"x 5". Nye specifications call for the removal of .020 on both sides.

Output was doubled on dies 2½"x 2½", and smaller, with the aid of a special hydraulically-operated fixture which passes two dies between the grinding wheels while two more are being fed into it at the opposite end. This means that loading and grinding operations are practically continuous.

When grinding operations call for special equipment, let Besly help you. Besly engineers, with a "know how" accumulated over half a century, can match your needs with the right grinder and the right abrasive—to do the job as it should be done—quickly, accurately and at low cost.

GET THIS BOOKLET...
Write for it today on your business letterhead. If's free! Every abrasives user will find it helpful as a useful and timely reference on grinding wheels and abrasives. Besly Titan Stones are uniform, easy to use...they speed production.

BESLY BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

CHARLES H. BESLY AND COMPANY, 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

GAP CO., Dept. T, 107-119 Monroe St., Garfield, N. J. It contains a brief record of the historical background and development of electronic heating, explains the principle of its operation, describes the two chief methods and fields of application and lists many proved present day uses. Many illustrations are used to make all the important parts of the text easily understood and several types of High Frequency Generators are shown.
INFORM-A-GRAM KEY No. D33-X

V-BELT DRIVE CATALOG, No. B6051E, containing required information for making correct drive selections, reduced to handy charts, tables and drawings, has been released by the ALLIS-CHALMERS MFG. CO., Dept. TD, Milwaukee 1, Wis. Newest V-belt drive product covered in this Texrope drive engineering summary is the new "Magic-Grip" sheave, designed for fast, easy mounting and dismounting. A quick-picture story of the sheave and complete facts for applying are offered.
INFORM-A-GRAM KEY No. 183-X

"FIFTY FACTS" is the title of an interesting new booklet issued by PERFECTION TOOL & METAL HEAT TREATING CO., Dept. T, 1740 W. Hubbard St., Chicago 22, Ill. It cites actual experience in fifty manufacturing plants, showing how more than half the tools in common use may be made to work longer and better, through the use of new and better ways of hardening soft steels and a supplementary treatment called "AD-LIFE" for previously hardened, finished tools.
INFORM-A-GRAM KEY No. D32-X

REAMERS & BORING BARS are described in a highly illustrated Catalog No. 44 published by the WETMORE REAMER CO., Dept. D, 418 N. 27th St., Milwaukee 8, Wis. Free cutting, absolutely smooth holes, with no scoring by the reamer while backing out after the cut, are the results of the perfected Wetmore Reamer design. One of the features of Wetmore Boring Bars is their locking device which locks tool solidly and positively without changing its setting. This eliminates breakage and prevents shifting of tool under load.
INFORM-A-GRAM KEY No. 838-X

HYDRAULIC CIRCUITS for industrial equipment are featured in a new 28-page booklet released by the JOHN S. BARNES CORP., Dept. T, 301 S. Water St., Rockford, Ill. Typical installations of these units are shown along with detailed information. Applications of Barnes Hydraulic Circuits to lathes, riveters, shell turning machines, presses, grinders and other machine tools and industrial equipment are described.
INFORM-A-GRAM KEY No. A38-X

LUERS TYPE CUTTING-OFF BLADE which does not require any grinding to prepare it for use is pictorially described in a bulletin available from the EMPIRE TOOL CO., Dept. TD, 8774 Grinnell Ave., Detroit 13, Mich. Resharpening will be required only on the front face. Side and back clearances remain constant for the life of the blade. These blades are used on hand and automatic screw machines.
INFORM-A-GRAM KEY No. 554-X

ZIM CUTTER NO. 2, designed to cut one or a hundred rings to very accurate sizes from any coil or spiral packings, is described in an illustrated folder published by the ZIMMERMAN PACKING CO., Dept. TD, Cincinnati, Ohio. Asbestos, rubber, duck, cotton, flax, leather, lead, copper and particularly all types of "plastic" packings can be cut quickly and easily. Square butt or beveled butt joint rings can be cut most effectively. Regular baveled and step joints can also be made. This tool weighs only 17 lbs and can be attached to a bench or easily carried to any location.
INFORM-A-GRAM KEY No. A46-X

AUTOMATIC CENTRAL PUMPING UNIT DC-25 for centralized lubrication is explained and illustrated diagrammatically in Bulletin 40 available from the FARVAL CORP., Dept. DJ, 3249 E. 80th St., Cleveland, Ohio. This small size, double plunger, slide valve type of pumping unit provides a positive high pressure pump for the handling of all types of lubricants without the use of springs, check valves or stuffing boxes. The complete system will handle either oil or grease and requires no attention except the renewal of the lubricant supply in the reservoir.
INFORM-A-GRAM KEY No. 413-X

AIRCRAFT & SHEET METAL WORKING TOOLS are pictorially described in a 6-page folder issued by C-B TOOL CO., Aircraft Tool Div., Dept. TD, Lancaster, Pa. The C-B Lightening Hole Punch blanks the desired size hole, flanges the metal around it and flattens the surrounding metal to its original plane. They are available in eleven popular sizes which are listed in the folder. The new Royal Clipper cuts sheet metal, fibre board, plywood or any light sheet material to any pattern desired. With this Royal Clipper any ¼" electric drill can be converted into a metal cutter.
INFORM-A-GRAM KEY No. D19-X

RANITE HARD SURFACING ELECTRODES, used for the purpose of applying a hard, tough, and wear-resistant layer of metal to surfaces subject to severe abrading conditions, are discussed in a general information booklet published by the RANKIN MFG. CO., Dept. DJ, 1405 W. Washington Blvd., Los Angeles, Cal. All types of Ranite are to be applied with the electric arc as they are not suitable for application by the acetylene

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FLAME-HARDENING STEEL DIES—Presents technical information on this unique development for longer die life.

INFRA-RED IN INDUSTRY—This excellent treatise discusses, among other things, the combined use of freezing units and infra-red heating systems. Complete with tables and text.

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THREAD GRINDING TECHNIQUE—Illustrated treatise covering wheel and work speeds; depths of cut and proper choice of wheel grades. Valuable training aid explaining thread grinding machines and methods.

THREADING TECHNIQUE—Points out to tooling and production men how to obtain longer tap use. Gives tap and thread terms, types of taps and machines, checked list of trouble sources, etc.

WELDING TECHNIQUE—Detailed, illustrated discussion on arc, carbon arc, metallic arc and shielded arc welding.

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method. Ranite cannot be applied to non-ferrous alloys such as aluminum, copper, bronze, etc., but it is easily and successfully applied to practically every type of steel and also to cast iron.
INFORM-A-GRAM KEY No. D21-X

REX FLAT SPRAY NOZZLES for washing, cleaning, cooling and descaling are illustrated in Bulletin No. 459 released by the CHAIN BELT CO., Dept. T, 1600 W. Bruce St., Milwaukee 4, Wis. Besides illustrating and describing the nozzle uses, the folder gives tabular information concerning their discharge in gallons per minute; their dimensions; a list of materials, sizes and prices. The high velocity spray from the Rex Flat Spray Nozzle is concentrated on a thin, flat line of impact. The resulting sharp cutting action produces better cleaning than the diffusing type of spray.
INFORM-A-GRAM KEY No. 815-X

PROTECTIVE COATINGS, used for a number of different purposes in connection with cleaning, plating and finishing operations, for protection and beautification of finished surfaces, and for rust prevention, are featured in Catalog 44 published by the MICHIGAN CHROME & CHEMICAL CO., Dept. D, 6350 E. Jefferson Ave., Detroit, Mich. The first section of the manual is devoted to a general discussion of the materials which are available and their principal characteristics. In the next section specific uses of Micro protective coatings are covered in full detail. Following specific uses will be found a section devoted to recommended instructions for the use of each product.
INFORM-A-GRAM KEY No. 997-X

UNIVERSAL CARBIDE TOOL GRINDERS are described in an illustrated bulletin issued by the K. O. LEE CO., Dept. 36-45, Aberdeen, S. Dakota. Model B604 is built for fast and accurate grinding of single point conventional tools and is equipped with the No. A645 Tilting Tool Rest Table, built for accurate adjustment from horizontal to 20° below. All K-O Grinders are equipped with reversing type motor.
INFORM-A-GRAM KEY No. 361-X

SUMP TANK CLEANING MACHINE, Model 20-T, is pictorially described in a 4-page bulletin issued by the W. R. CARNES CO., Dept. J, 2066 Helena St., Madison 4, Wis. This compact portable unit designed for easy handling by one operator is particularly recommended for cleaning sump tanks on automatics where heavy mineral cutting oil is used, on thread and gear grinding machines, where mineral coolants are employed, and for all applications where fast sump tank cleaning and efficient, high volume filtering must be done.
INFORM-A-GRAM KEY No. 728-X

ELECTRICAL REFRIGERATION CABINET for processing metal parts and tools consistently at closely controlled temperatures as low as 150° below zero is shown in Bulletin SZ-443 published by the KOLD-HOLD MFG. CO., Dept. T, 424 N. Grand Ave., Lansing 4, Mich. This extremely simple and easy-to-handle unit is especially designed for hardening steel tools, making expansion fits on close tolerance assemblies, and for metallurgical research.
INFORM-A-GRAM KEY No. 84-X

STANDARD METAL CUTTING SAWS possessing speed and accurate cutting are pictorially described in Bulletin 52 published by the PEERLESS MACHINE CO., Dept. TD, 1600 Junction Ave., Racine, Wis. A blade cooling system which provides for coolant to be pumped up to protect the blade before the first stroke is started is an important feature. All standard machines have open type saw frames which permit loading from the front or side to accommodate structures of varying sizes and odd shapes.
INFORM-A-GRAM KEY No. 680-X

METAL DUST COLLECTOR—This self-contained portable unit which has many applications in both large and small shops is described in an illustrated folder issued by the DELTA MFG. CO., Dept. J, 600 E. Vienna Ave., Milwaukee 1, Wis. By virtue of collecting both fine and coarse dust and particles it protects workers' health and keeps harmful metal dust away from other machinery.
INFORM-A-GRAM KEY No. 51-X

BEMISINE SINE-ANGLE PLATE consisting of a drilled and tapped steel plate mounted pivotally on a right-angular base is pictorially described in a 4-page folder issued by the NICHOLS-MORRIS CORP., Dept. J, 44 Church St., New York 7, N. Y. The Bemisine requires only a 2" micrometer and the same table of Sines and Cosines used with the conventional sine bar in order to set or measure angles from 0 to 90°. It converts setup time to working time on grinding, jig boring, drilling, and light milling operations and provides a simple means of dressing accurate angles on grinding wheels.
INFORM-A-GRAM KEY No. 943-X

GIBRALTAR "RAD-TREAT"—a compounded oil and rust preventive which emulsifies quickly with water or any anti-freeze has been announced by the HOOD REFINING CO., Dept. J, 262 N. Hamilton Ave., Greensburg, Pa. It is not a solvent but will keep radiators, water jackets and cooling systems clean and will prevent rust and corrosion. Gibraltar Rad-Treat will also lubricate packing glands in pumps, at the same time preventing shrinking and glazing of the packing. When caustic solutions are used to flush out a radiator, it is recommended that Rad-Treat be added afterwards in order to neutralize any acid condi-

NEW METHOD STEEL STAMPS INC.

147 JOS. CAMPAU ST. DETROIT 7, U. S. A.

tion produced by the caustic. Literature will be furnished on request.
INFORM-A-GRAM KEY No. D35-X

NEW HARD-FACING METAL called Fanweld is described in Bulletin F-428 released by the FANSTEEL METALLURGICAL CORP., Dept. TD, N. Chicago, Ill. This non-ferrous metal is intended for acetylene torch application to steel, and possesses marked resistance to abrasion, heat, impact and erosion. Fanweld contains tantalum-columbium carbide which imparts a peculiar self-lubricating action, minimizing the destructive effects of friction even at elevated temperatures. It is unusually well suited for hot work punches, dies and tools, and is available in 5/16" and 1/4" diameter rods in 14" lengths.
INFORM-A-GRAM KEY No. D36-X

ALL-STEEL POWER SHEARS, in a variety of models and range of capacities for handling sheet stock in thicknesses from 10 gauge to 1¼" and in lengths of cut up to 18', are featured in Catalog S-4 published by the CINCINNATI SHAPER CO., Dept. TD, Cincinnati, Ohio. They are designed for and furnished with four-edged knives as standard equipment which give four cutting edges on each knife before regrinding is necessary. Straight and parallel cuts are secured and sheets are squared without setting the back gauge or squaring arm out of line to compensate for creep.
INFORM-A-GRAM KEY No. 630-X

MAGNA-SINE—Both Magnetic Sine Table and Non-Magnetic Sine Plate, adaptable to a wide range of grinding and inspection operations are featured in a 4-page bulletin published by ROBBINS ENGINEERING CO., Dept. T, 318 Midland Ave., Detroit 3, Mich. Available in two models and sizes the Magna-Sine is a magnetic sine table employed to hold a magnetic material at any required angle—either single or compound—for purposes of grinding, honing, lapping, machining, inspecting or checking flat surfaces, holes, bevels, chamfers, etc., which are at an angle in relation to the base surface.
INFORM-A-GRAM KEY No. 617-X

HEINRICH HANDNIB for nibbling, rod cutting and shearing is described in an illustrated folder issued by the NATIONAL MACHINE TOOL CO., Dept. T, 1536 Clark St., Racine, Wis. This heavy-duty portable machine shears wide sheets and the special body design permits the sliding of the metal in any width or length to complete the operation. The folder suggests drilling one hole only for the inside nibbling operation—then nibbling to the desired shape.
INFORM-A-GRAM KEY No. D46-X

STUART "ABRAZOR"—A precision belt grinder for small radii work is described in a 4-page illustrated folder published by STUART INDUSTRIES, INC., Dept. TD, 75 Bellevue St., Newton 58, Mass. The "Abrazor" which fits all standard drill presses should be of interest to those working on metal, wood, glass or plastics. Methods of operation and uses are given along with specifications.
INFORM-A-GRAM KEY No. D39-X

BORING TOOLS—A stock tool Bulletin, No. 115, describing its line of both "convertible" carbide tipped and solid carbide boring tools carried in stock and available for immediate delivery, has been issued by the TUNGSTEN CARBIDE TOOL CO., Dept. D, 2661 Joy Rd., Detroit 6, Mich. The "convertible" boring tools are recommended for use where facilities are available for finish grinding the edges to desired shapes. These tools are shown in two styles with a flat top or a back rake tip. Each is available in four sizes ranging from 5/16" to ½" diameter.
INFORM-A-GRAM KEY No. 887-X

MOTORIZED TRANSMISSIONS FOR CONE DRIVES are featured in a 6-page catalog entitled "As many as 500 in one plant". Just released by WESTERN MFG. CO., Dept. J, 3400 Scotten Ave., Detroit 10, Mich., it illustrates how Multi-Motor-Mount makes practical the adaptation of two models of Western Transmissions, a Master (capacity 1-5 hp) and a Major (capacity 5-10 hp) to most any cone driven machine tool. There is also a Super (capacity up to 30 hp). Thirty-six different installations are pictured, including lathes, shapers, milling machines, automatic slotters, vertical and horizontal boring mills.
INFORM-A-GRAM KEY No. 83-X

MIKROKATOR, an instrument designed for precision measurements which employs frictionless amplification, is described in Catalog No. 440 available from the SWEDISH GAGE CO. OF AMERICA, Dept. J, 8900 Alpine Ave., Detroit 4, Mich. This mechanism has no friction bearings, and contains no racks, pinions, gears, levers, or other moving parts subject to wear, with resulting lag, back-lash and loss of accuracy through continued use. This compact, self-contained unit requires no lights nor electromagnets as the amplification is 100% mechanical. Heat generated by lights or electrically energized coils is absent, thus eliminating a warming up period to permit the temperature of the instrument to become stabilized. Instrument, stand, gage blocks, and work can all be kept at uniform room temperature.
INFORM-A-GRAM KEY No. B85-X

PAX INTERCOMMUNICATION SYSTEMS which provide direct contact between all departments of an organization and keep outside telephone lines clear are pictorially described in Form 766 published by the KELLOGG

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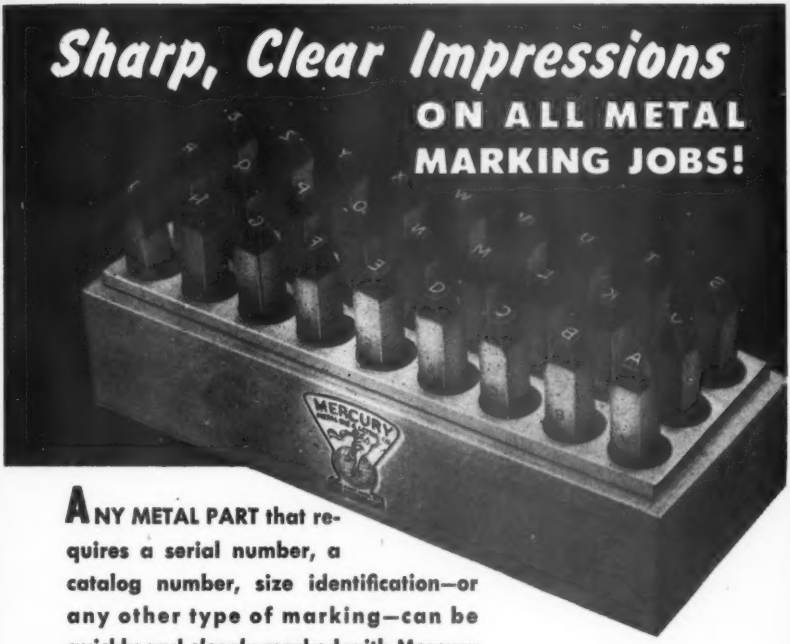

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These Stamps are made of the finest carbon steel to protect against breakage and give you years of service on all part marking work. The letters or figures are deep cut with sharp faces for ease of stamping on even the hardest metals. Accurate bevel further assures clear impressions, and aids in alignment. The husky steel body is amply large to withstand severest use.

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INFORM-A-GRAM KEY No.D52-X

HWD & CROMOVAN DIE STEELS for hot and cold work respectively are featured in a 4-page leaflet issued by the FIRTH-STERLING STEEL CO., Dept. J, McKeesport, Pa. HWD Die Steel provides exceptional toughness and is recommended for general hot work operations involving severe pressure or impact, including forming, forging and die casting. Cromovan Die Steel is used for cutting and forming dies, and for many special operations where conditions are unusual.
INFORM-A-GRAM KEY No. 10-X

OIL POWER TRANSMISSION for variable speeds is presented in Bulletin No. 124 recently issued by the Pump Div. of the SUNDSTRAND MACHINE TOOL CO., Dept. T, 2531 Eleventh St., Rockford, Ill. The Sundstrand 2HT Oil Power Transmission is a combination piston type pump and fluid motor having effective output speeds ranging from 10 to 2400 rpm. This bulletin illustrates and describes the operating principles, features, possible applications, and engineering data of Sundstrand Oil Power Transmissions.
INFORM-A-GRAM KEY No. 36-X

RAPIDESIGN DETAILER—A compact 9 in 1 ellipse instrument that does away with the use of angles, compass, rules and the usual lengthy methods of calculations is pictorially described in a group of leaflets issued by MARTIN DESIGN STUDIOS, Dept. J, 111-B S. Orange St., Glendale 4, Cal. Each instrument, made of Du Pont "Pyralin", gives 17 ellipse sizes from 3/8" to 2¾" wide. This, together with the complete three-piece set having 30°, 45°, 60° projections, covers the range of smaller ellipse sizes most difficult to lay out and most generally used in perspective drawing. This set is recommended for engineers, architects, draftsmen, artists and designers.
INFORM-A-GRAM KEY No. A14-X

HARGRAVE FILE CLEANER with Chip Plow quickly and efficiently cleans a file of soft metal chips, lead, copper, aluminum and soft steel. This new file cleaner, on which patent is pending, is listed as No. 366 in a bulletin issued by the CINCINNATI TOOL CO., Dept. TD, 4111 Montgomery Rd., Cincinnati 12, Ohio. A special square-shaped plate is fastened to the frame of a File Cleaner of the Company's regular high standard. This plate or plow, made of soft steel, is used by striking one edge on the file to be cleaned, thus impressing the tooth pattern on the edge. The plow is then pushed parallel to the file grooves. It "plows" out the imbedded chips and dirt. When a file of different tooth-spacing is to be cleaned, a new edge of the plate is used.
INFORM-A-GRAM KEY No. D47-X

PARALLELS, V-BLOCKS & ANGLE PLATES are described in a folder issued by the FRANK McMAHON CO., Dept. TJ, 142 S. June St., Dayton 3, Ohio. The McMahon Parallels and V-Blocks are for use with magnetic chucks and are of the laminated magnetic and non-magnetic material construction, firmly held together by non-magnetic rivets. The parallels range in size from 7/8" x 1 7/8" x 3 5/8" to 1 3/32" x 3" x 6". The V-100 series of V-blocks has two vees per block while the V-200 series has a single 90° vee. The McMahon Adjustable Angle Plates are offered both in cast iron and hardened and ground steel. T-slots are used for holding work on the iron adjustable angle plates, while the work holding means for the steel model is a pattern of drilled and tapped holes.
INFORM-A-GRAM KEY No. C84-X

STRENES METAL—A special alloy metal for cast-to-shape drawing and forming dies is pictorially described in a 4-page leaflet published by the ADVANCE FOUNDRY CO., Dept. T, 100 Parnell Ave., Dayton, Ohio. Automotive plants recommend this metal for forming bodies, fenders, hoods and various other parts for cars, trucks, tractors and planes. Long wearing and highly successful on deep draw operations and long runs, Strenes metal is close grained and takes a high polish.
INFORM-A-GRAM KEY No. B84-X

DRAFTO METAL DISINTEGRATOR is described in a 4-page illustrated folder issued by the DRAFTO CORPORATION, Dept. D, Cochranton, Pa. This compact, portable unit operates on any 110v-60 cycle power source. Any metal can be disintegrated by means of a vibrating arc centering directly over the embedded material. A special coolant assists disintegration, helps to cool electrodes, and prevents heat distortion. There is no possibility of damage to delicate contours of dies or work pieces.
INFORM-A-GRAM KEY No. D59-X

PYRO OPTICAL PYROMETER—A precision instrument for measuring high temperatures, based on the principle of the radiation of light, is described and illustrated in Catalog 80 released by the PYROMETER INSTRUMENT CO., Dept. D, 103-105 Lafayette St., New York, N. Y. This unit which resembles a telescope is equipped with a small ordinary battery and with ammeter and adjusting rheostat, these being in circuit with a small calibrated lamp to illuminate the small comparison test mark, and to maintain its intensity or brightness constant.
INFORM-A-GRAM KEY No. D57-X

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"BETHLEHEM HM"	BETHLEHEM STEEL COMPANY Bethlehem, Pa.	"STAR MAX"	CARPENTER STEEL COMPANY Reading, Pa.	"TATMO"	LATROBE ELECTRIC STEEL COMPANY Latrobe, Pa.
"MO-CUT"	BRAEBURN ALLOY STEEL CORPORATION Braeburn, Pa.	"MOLITE 8"	COLUMBIA TOOL STEEL COMPANY Chicago Heights, Ill.	"S. T. M."	SIMONDS SAW & STEEL COMPANY Lockport, N. Y.
		"REX T-MO"	CRUCIBLE STEEL CO. OF AMERICA New York, N. Y.	"MO-TUNG"	UNIVERSAL-CYCLOPS STEEL CORPORATION Bridgeville, Pa.
		"DI-MOL"	HENRY DISSTON & SONS, INC. Philadelphia, Pa.	"8-N-2"	VANADIUM-ALLOYS STEEL COMPANY Latrobe, Pa.
		"REX T-MO"	HALCOMB STEEL COMPANY Syracuse, N. Y.	"VUL-MO"	VULCAN CRUCIBLE STEEL COMPANY Aliquippa, Pa.

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● The *Fifth* Edition of the 57-page MO-MAX Handbook gives a wealth of information about high-speed steels. Whether or not you are now using MO-MAX, you should send for a copy of this clear, concise booklet.

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Tests conducted over a period of years have proven that MO-MAX gives better-than-average performance in drills, reamers, lathe tools, cut-off tools, tool bits, milling cutters, hobs, circular saws, thread rolling dies, counterbores, broaches, lathe centers, spot facers, circular and flat forming tools, dies for both hot and cold work, taps, thread chasers, etc. The new Handbook tells how *you,* too, can utilize the advantages of this remarkable high speed steel. Use the coupon below.

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PANTO UTILITY ENGRAVER for engraving electrical marking and acid etching is illustrated in an 8-page descriptive booklet issued by H. P. PREIS ENGRAVING MACHINE CO., Dept. J, 155 Summit St., Newark 4, N. J. The UE-3 Panto Engraver is a bench-type engraving machine, recommended where engraving or marking on metals or plastics is required. It is of compact design, with the work table and copy holder on the same level, right in front of the operator, assuring easy control of both the tracing of the master template and the manipulation of the cutter spindle mechanism. Additional equipment and attachments are shown.
INFORM-A-GRAM KEY No. D58-X

QUICK CHANGE LATHE TOOLS which make possible all operation changes without the use of wrenches are described in a 4-page illustrated folder issued by the KYLE-JOHNSON MACHINE CO., Dept. T, 1627 W. Pico Blvd., Los Angeles 15, Calif. These tools will take all the feed the lathe itself will stand. All torque is taken up by the vertical adjusting screw. Strong, rigid and vibrationless, they are perfect holders for cemented carbide bits, and will prolong tool life.
INFORM-A-GRAM KEY No. B60-X

UTILITY SLEEVE TOOL DRIVER which cuts small tool costs by functioning as a removable taper shank is the subject of Index A issued by the J. C. GLENZER CO., Dept. TD, 6463 Epworth Blvd., Detroit, Mich. Utility Sleeves were designed to be used with straight shank tools and represent the taper shank commonly used in solid or one piece taper shank tools. They give operators all the speed and convenience of taper shank tools by supplying a positive drive taper shank for straight shank drills, taps, countersinks, reamers and other small tools.
INFORM-A-GRAM KEY No. B56-X

RZEPPA UNIVERSAL JOINTS are featured in an illustrated booklet issued by the GEAR GRINDING MACHINE CO., Dept. TJ, 3901 Christopher Ave., Detroit 11, Mich. Disc Type Joints including flexible shaft seal, outer race, disc joint assembly, special disc joint with splined rim for hub of independently sprung bus rear wheel and disc joint coupling allowing angular and axial shaft misalignment are illustrated.
INFORM-A-GRAM KEY No. B42-X

TACHOMETERS, designed to show instantaneously and continuously the speed or fluctuation in speed of any rotating part, are illustrated in Bulletin 44-1 published by the JONES MOTROLA CO., Dept. TD, Fairfield Ave., Stamford, Conn. Four models of Jones individual-mount tachometers and the Jones multi-range portable hand tachometer are described. The bulletin shows both full-face and profile views of the individual tachometers, rpm ranges available, mounting dimensions, and includes prices for tachometers and appurtenances, a section on use and operation, and general installation data.
INFORM-A-GRAM KEY No. D53-X

GLENNY ADJUSTABLE EXPANSION PUSH BROACH, particularly adaptable for keyway cutting, replacing slower more expensive setups and often in relieving larger equipment for other work, is pictorially described in Bulletin No. 9 recently issued by EAST SHORE MACHINE PRODUCTS CO., Dept. T, 835 E. 140 St., Cleveland 10, Ohio. Work may be done on an arbor press, without the use of power expense, on a lathe or in series with step-by-step operations on a turret lathe. Engineering data lists Standard recommendations for average work. Tool room sets to cover the full range of work are furnished in compact, serviceable, wooden, compartment boxes.
INFORM-A-GRAM KEY No. D54-X

SYNTHETIC OPTICAL CRYSTALS weighing up to 35 lbs are featured in an illustrated booklet published by the HARSHAW CHEMICAL CO., Dept. D, 1945 E. 97 St., Cleveland 6, Ohio. Prisms of synthetic crystal which greatly expand the scope of infra-red spectroscopy are illustrated. A pictorial story arranged in sequence with the laboratory procedure in growing a synthetic crystal is shown. The transformation of pure table salt into synthetic crystals, larger and purer than those grown by nature, is pictured, step-by-step.
INFORM-A-GRAM KEY No. D55-X

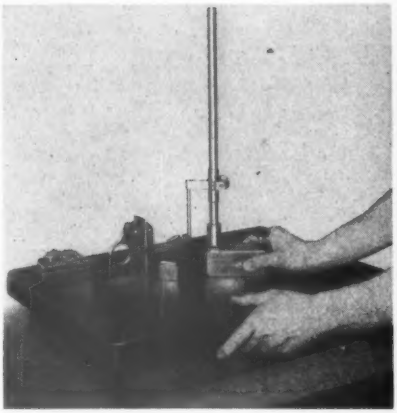
AN-COR-LOX LOCK NUTS, available in a complete range of sizes and metals, including corrosion-resistant alloys are pictorially described in a 6-page bulletin published by the LAMINATED SHIM CO., INC., Dept. T, 84 Union St., Glenbrook, Conn. These lock nuts can be applied with a standard wrench as no special tools are required. They can be used on regular length bolts, or even on short bolts; are not affected by sawed-off bolts or studs, cotter pin holes, or bolt thread imperfections.
INFORM-A-GRAM KEY No. 354-X

DEEPFREEZE INDUSTRIAL CHILLING EQUIPMENT applied to shrinking, testing and treating of metals, is the subject of the technical data and operating manual published by the Deepfreeze Division, Motor Products Corp., Dept. TJ, 2336 Davis St., North Chicago, Ill. Deepfreeze sub-zero temperatures are applicable to metal shrinking, chilling for shrink-fit assembly, chilling aluminum rivets, the testing of metal and materials and other miscellaneous processes. This manual includes complete descriptions of Deepfreeze equipment, that is each chilling machine's specifications and the uses for which it is designed besides recommendations for its most efficient operation. In addition to the standard Deepfreeze

Precision Test INDICATOR BASE

Specially Designed For Checking With Tenth Indicators

It can be set within two-thousandths by using sliding member on rod because of long bearing on sliding member which prevents indicator from tipping forward when brought into contact with the work. Fine adjustment can be easily made with thumb screw on top of base.



WORKING RANGE **of indicator is from surface plate to the full length of the indicator arm above top of rod. Although it has long range, it is so rigidly and sturdily constructed as to eliminate all vibration and make accurate repetition of indicator reading.**

Base Mounted On Hardened Steel Balls

This outstanding feature prevents sticking on surface plate of any material; yet the adjusting screw can be turned without holding the base to keep it from turning or sliding on the plate.

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equipment herein described, special machines can be furnished for specific chilling requirements. Many of the solutions to industrial metal chilling problems have been solved by the user and Deepfreeze engineers working together. Whether you have a problem in metal shrinking, testing or treating, or, whether you're not sure if Deepfreeze can be applied to your manufacturing, Deepfreeze engineers will be glad to assist you in determining which capacity and temperature range are best suited to your particular requirements.
INFORM-A-GRAM KEY No. 404-X

SINE ANGLE WHEEL DRESSERS, developed as an aid to speed and accuracy in angle form grinding, have been manufactured by the FLORIAN MFG. CO., Dept. TDJ, Plantsville, Conn. These tools eliminate the necessity of costly special equipment or the alternative of time-consuming makeshift set-ups for dressing the wheels of surface grinders to required angles. By their use, and with the aid of standard gage blocks or adjustable parallels, wheels may be quickly dressed to any angle from 0° to 90° with assurance that the angles will be accurate within plus or minus 10 seconds. Literature is available upon request.
INFORM-A-GRAM KEY No. 758-X

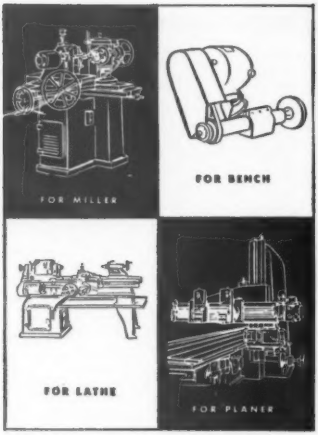
TYPE K THERMOSTAT for control of electric devices between temperatures of minus 120° and 600° F is described in Bulletin 441T released by the UNITED ELECTRIC CONTROLS CO., Dept. J, 69-71 A St., Boston 27, Mass. Type K with pilot light is illustrated. This special model is often used in groups with various colors of pilot lights, or for illuminating numbers, letters, etc., to show the sequence of temperature changes within the unit being controlled. The Type K and other types are made for a variety of applications including multiple switching, fixed adjustments, remote dials, variations of range and differential.
INFORM-A-GRAM KEY No. D60-X

PRECISION MEASURING TOOLS—The most recent publication, Catalog and Handbook No. 32 published by the VAN KEUREN CO., Dept. TJ, Watertown 72, Mass., covers the entire line of optical and mechanical inspection equipment offered by this manufacturer. Combining product descriptions with operating instructions the handbook covers light wave measuring equipment from optical flats to the Van Keuren light wave micrometer and its accessories. In the mechanical categories are plug gages and handles; rectangular, flat pattern gage blocks and the new Van Keuren solid square master blocks; microgages; such toolroom accessories as laps, surface plates, 45° and 60° shop triangles, steel optical flats; micrometer correcting laps and inspection kits; thread measuring wires and gear tooth measuring wires. The handbook contains 38 tables of data and constants covering measurements, all types of threads and gear tooth specifications. A 55-page appendix contains a great variety of valuable shop information.
INFORM-A-GRAM KEY No. 508-X

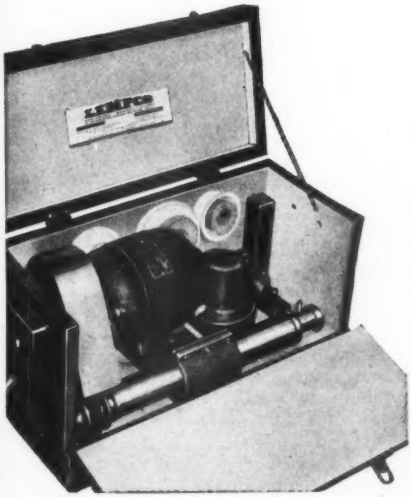
BOWGAGE HEAD—A self-contained unit, applicable to modernizing old machines, for automatic grinding wheel feed is featured in a 4-page leaflet issued by the FITCHBURG GRINDING MACHINE CORP., Dept. T, 1503 Walnut St., Fitchburg, Mass. The head has rapid traverse, slow grinding feed, grinding dwell or spark out, and rapid return to starting position, all started by one push button. The rate of grinding feed is controlled by a hydraulic metering valve through a dial on the panel. The dwell time is governed by a Telechron clock-controlled time delay switch. The rate of rapid traverse is constant and the amount is set at the factory anywhere between zero and five inches.
INFORM-A-GRAM KEY No. 115-X

PROFILE GRINDERS—A 4-page illustrated bulletin descriptive of bench and floor model profile grinders is available from the BOYAR-SCHULTZ CORP., Dept. J, 2110 Walnut St., Chicago 12, Ill. The Boyar-Schultz No. 1 Profile Grinder is a fast operating, precision machine for saving time in grinding difficult contours, odd and irregular shapes and profiles, and similar time consuming jobs. In addition to grinding and regrinding die clearances, repairing dies and sharpening punches, the devising of guiding fixtures or templates makes possible contour grinding on a production basis. The small machine occupies bench space of only 10½" x 16"; the spindle protrudes upward through the work table and is driven from below the table. The spindle, mounted in preloaded, precision ball bearings, rotates at 20,000 rpm with a vertical, ⅛" reciprocation of 100 per minute. The Boyar-Schultz No. 2 Profile Grinder is a floor model machine, available with either single or dual spindle arrangement. It has a spindle speed of 10,000 rpm and in addition to the usual toolroom applications it is a machine of great diversity and value in experimental and development work.
INFORM-A-GRAM KEY No. 612-X

INDUCTION HEATING & MELTING IN INDUSTRY since 1916 is related in Bulletin 25 just published by the AJAX ELECTROTHERMIC CORP., Dept. TD, Ajax Park, Trenton 5, N. J. Starting off with the history of induction heating, and a description of what it is, the bulletin contains many pages of interesting applications showing how high-frequency heat can be put to work in plants to save time, produce more accurate results, reduce spoilage, and to do heating jobs that couldn't be done before.
INFORM-A-GRAM KEY No. D63-X



A PORTABLE PRECISION TOOL POST GRINDER THAT MAY BE USED ANYWHERE . . . THAT IS USED EVERYWHERE . . . .



. . . easy to attach and use efficiently on bench, lathe, shaper, planer or miller—or be switched from one to the other in a few minutes. Exclusive Lempco base construction gives you the equivalent of two different length quills at no extra cost. Pre-loaded matched sets of bearings; 6,000 to 13,000 R.P.M. spindle speeds; rigid 1-piece frame. For precision internal, external, face and taper grinds. Handy fitted chest available for storage or carrying. Good delivery. Ceiling-priced.

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A SELF-CONTAINED MOTOR-DRIVEN PNEUMATIC HAMMER THAT IS INDEPENDENT OF STEAM OR AIR LINES

The Chambersburg Pneumatic Forging Hammer is of the self-contained type having a built-in compressor. The ram is driven up and down by flexible pneumatic force, created by the compressor piston, which is driven by an electric motor of high speed through 2-stage speed reduction gearing. The hammer can be started instantly and strikes a constant number of blows, heavy or light, at the will of the operator. *Write for Bulletin 1275.*

Chambersburg Engineering Co.
CHAMBERSBURG PENNA.

New Navy Films Available

Two new Navy motion pictures, both going behind the headlines of the stepped-up Pacific offensive, have been announced for current showings to war plant and labor union audiences by Rear Admiral Clark H. Woodward, Chief of the Navy's Industrial Incentive Division.

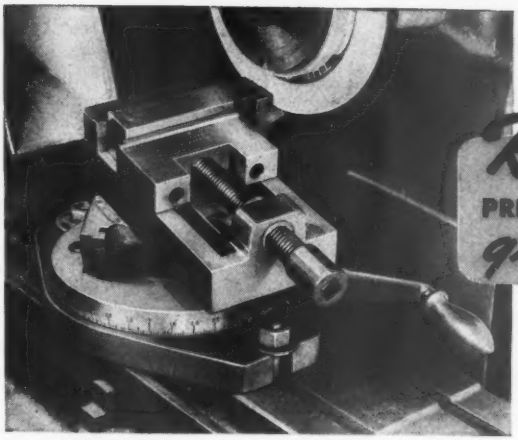
"Fortress Japan" is an 18-minute film which dispels a popular illusion. The Nipponese homeland is depicted in its true light, i. e., an up-to-date, thoroughly modern industrial nation, politically geared and efficiently organized 100% for a protracted war. Japan is shown not only as a completely integrated mass of machines and materials, but, perhaps even more important, as a nation of men and women, hardened by training from early youth for the rigors of a life-or-death struggle. The subject was produced by the Film Board of Canada and is being distributed to war plants and labor groups in the United States by the Incentive Division.

"LVT—The Beachbuster" is an autobiography of one of the versatile amphibian tractors whose dramatic actions are increasingly involved in the attacks on Japanese-held shores. Current news reports tell of LVT's "growling ashore" at Iwo Jima. The new film, with a running time of 9 minutes, was filmed by Marine Corps combat camera crews, and tells the story of one "beachbuster" from its proving ground days, through its debarkation at some Pacific island from a transport offshore, its approach to the beach under naval and aerial gunfire and its push into the jungle.

These and other current Navy films may be obtained in both 16mm and 35mm sizes from 85 official depositories of Army and Navy incentive film, strategically located in and near production centers throughout the country.

★

N. A. Woodworth Company of Ferndale, Michigan, and its employees were recently notified of their fourth citation by the War Department for a "distinguished record" and "leadership" on the production front. For outstanding production records in the manufacture of precision gages, precision machined parts and precision tools, the Woodworth organization was awarded the Third Star for its Army-Navy "E" flag.



WESSON
ANGLE VISES

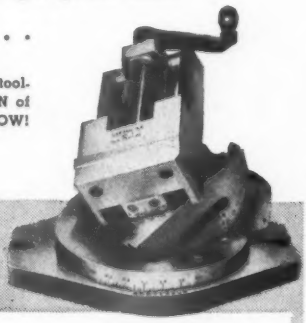
Right FOR PRECISION ANGLE *grinding*

Any standard grinder can be adapted quickly to precision angle grinding with WESSON Universal 3-Way Angle Vises. Quick set-up slashes costs!

Difficult compound angle grinding . . . as well as many other angle machining operations . . . can be made simple and with positive precision control through use of WESSON Angle Vises. Where a series of related angle operations are required, individual vises may be used for each operation, each vise being removable without disturbing its angle set-up. Saves many man-hours . . . assures high precision.

INVEST NOW FOR LOWER COSTS . . .
BE READY FOR CONVERSION

WESSON Angle Vises are available now . . . for present toolroom or production work, or for QUICK CONVERSION of standard machines to new work or production. BUY NOW!



WESSON *Universal* **VISES**
BUILT TO WESSON STANDARDS OF QUALITY AND PRECISION

WESSON PRODUCTS CO.
Dept. TD4, 709 Fisher Bldg.
Detroit 2, Michigan

Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

Name and Title .....

Firm Name .....

Address .....

City ..... State .....

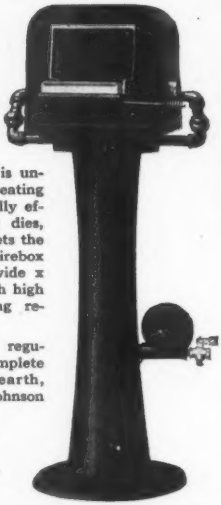
Johnson
Furnaces
for QUICK *Action*

Reduce Toolroom Bottlenecks with this Speedy Johnson No. 120 Heat-Treating Furnace . . .

● Gets hi-speed steel tools and dies back into production *before* conventional heat-treating furnace warms up!

Johnson
No. 120

Reaches
1500° F. in
5 minutes!
2300° F. in
30 minutes!



A low-cost unit that is unexcelled for heat-treating hi-speed steels. Equally efficient for hardening dies, punches and tools. Gets the job done quickly. Firebox is 5" high x 7¾" wide x 13½" long, lined with high temperature insulating refractory.

Temperatures easily regulated. Equipped complete with Carbofrax hearth, G.E. Motor and Johnson Blower.

$129.50
F.O.B. Factory

FREE Write for catalog showing all Quick Acting Johnson Furnaces for Hi-Speed Steel and other Heat-Treating purposes.

JOHNSON GAS APPLIANCE CO.
575 E Ave., N.W., Cedar Rapids, Iowa.

Please send Free Catalog of Johnson Quick Acting Furnaces.

Name .....

Address .....

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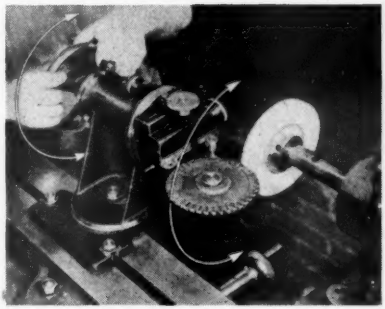
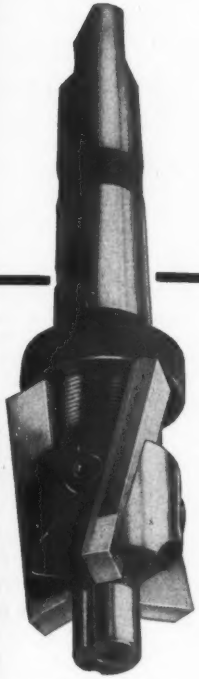
Radius Grinding Fixture

The New Model "B" Hill Radius Grinding Fixture, made by Hill Machine Co., Dept. TD, 1032 Mulberry St., Rockford, Illinois, was developed to fill a need for sharpening a large number of radius cutters. It will do a good job quickly, accurately and efficiently. It has all the adjustments needed for radius, feed, alignment, back-off angle, and arc. It will grind a 180° or any smaller arc, and certain angular or flat edges or surfaces. This fixture has a column which carries a horizontal spindle. On one end is the operating handwheel with a disc and adjustable stops to limit the



arc of swing. On the other end is the head which has two, micrometer-set, adjustable cross slides which are at 90°. These slides enable the positioning of the cutter so that the center of the tooth radius coincides with the centerline of the fixture spindle. The outer slide carries an adaptor plate onto which the work is clamped. On the inner side of the head is a graduated scale and also a lock plunger to secure the adaptor plate in the horizontal, or in the upper or lower vertical position. On the base there is a graduated scale for swinging the column to the desired back-off and there is an adjustable spring stop for index. Two fittings needed for the initial set-up are also furnished, a diamond dresser and a gage for squaring up the first tooth face. The fixture holds the cutter so that it can be swung around the center of the arc of the tooth profile and is designed to locate this center

(TO PAGE 152—PLEASE)



This is the only standard inserted blade type **FACING AND COUNTERBORING TOOL**

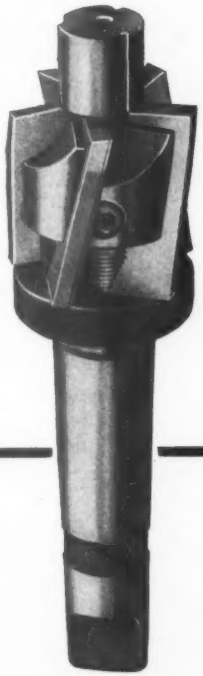
GENESEE

Replaceable Blades — Interchangeable Pilots — Constant Chip Space

STANDARD SIZES FROM 1¼ TO 4 IN. IN DIAMETER

STYLE H tools are designed for heavy cuts where maximum stock removal is required.

STYLE F tools are recommended for light finishing cuts where a very smooth and accurate finish is required.



Genesee Tools have blades set on a back slope to permit adjustment for size and regrinding diameter and front edge.

WRITE FOR COMPLETE CATALOG 44-T

ESTABLISHED IN 1908

GENESEE MANUFACTURING CO., INC.

ROCHESTER 4, N. Y., U. S. A.

Adjustable Hollow Mills and Special Production Tools

(CONT. FROM PAGE 113)

Visual Training Survey

Business and industry are making a steadily increasing application of visual education techniques to speed training and retraining of workers and in promoting other phases of activity, according to an extensive survey made by the Victor Animatograph Corp., Davenport, Iowa, a leading manufacturer of 16 millimeter sound and silent motion picture projectors.

The survey revealed that virtually every major manufacturer of war goods materiel is utilizing 16mm sound motion pictures for job training, to teach new techniques and to visualize general operational problems. Similar audio-visual procedures are in use by most of the major civilian goods producers.

The Army, Navy and other branches of the armed services, as well as Federal agencies allied with the war effort, gave powerful impetus to instruction with sound motion pictures by adopting this media for quick training of the millions of men called into service. By utilizing the factors of sight, sound and sequence, they have saved up to 30 percent in training time over orthodox methods.

Virtually all plants covered in the Victor survey declared their intention to continue the audio-visual training techniques on an increasing scale after the war because of their demonstrated value in teaching faster and more effectively.

SAE Research and Development in Aeronautical Engineering

Organization of a Special Aircraft Projects Subdivision of the Aeronautic Division, Society of Automotive Engineers, to undertake coordinated research and development in fundamental aeronautical engineering fields, has been announced by Division Chairman Arthur Nutt, of Aircraft Engine Div., Packard Motor Car Co., Toledo, O.

The subdivision already has initiated four projects. They are: development of a standard aeronautical drafting room practice manual; test procedures and design requirements for helicopter powerplants, transmissions, and drive mechanisms; standardization of inspection stamps and symbols used in the aircraft manufacturing industry; and aircraft engine cold starting requirements.

The subdivision's work will be coordinated with continuing projects of the Division's Aircraft Engine, Accessory & Equipment, Propeller, and Materials and Processes Coordinating Subdivisions, which are active in the fields of standardization, recommended engineering practices, and specifications. The new subdivision, however, will concentrate on fundamental engineering research and development problems underlying the work of the other subdivisions.

New York Group Negotiates Control of Firth-Sterling Steel Co.

A group of private investors has purchased a majority of the outstanding capital stock of the Firth-Sterling Steel Co., McKeesport, Pa. L. Gerald Firth, president of Firth-Sterling, stated that the New York group, headed by the banking firm of Lehman Brothers, after acquiring a majority of the common and preferred shares of the company from Thos. Firth & John Brown, Ltd., of Sheffield, England, and other British residents, is negotiating for the purchase of additional shares from other stockholders.

The company's active management and policies are to continue unchanged, but production, distribution and research are to be expanded. It is expected that the Lehman Brothers group will be represented on the board of directors. Firth-Sterling, in addition to ranking among the leading manufacturers of tool and die steels, is the second largest producer in this country of sintered carbides, the diamond-hard cutting materials that have been a major factor in the high production records achieved by war plants in recent years.

The Firth-Sterling Company was incorporated in 1889 and subsequently became a leader in the tool steel industry. It was the first American producer of

TRU-LINE multiple diamond tools require no turning. Machine down-time is reduced, production increased.

Diamonds are set in overlapping rows, providing a continuous and efficient cutting surface for the life of the tool—without changing, re-setting or adjusting.

Matrix forms a chemical bond with the diamonds, holding them securely until entirely used. Thin blade dissipates heat, safeguards the diamonds.

The effective use of smaller, carefully selected, high quality diamonds permits much lower diamond tool costs, yet assures efficient cutting.

TRU-LINE multiple diamond tools have consistently demonstrated their ability to deliver these four kinds of savings under all conditions of use on vital war material where speed, accuracy and finish are important factors. On many jobs they have completely replaced ordinary diamond tools.

There is a TRU-LINE tool for every type of straight, profile or step-dressing operation.

Send For This Book

It gives complete information on TRU-LINE tools, shows how they save time and money. Your copy gladly sent on request.

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue
Detroit 6 • Michigan

575 Langlois Avenue
Windsor, Ont. • Canada

stainless steel, and the first manufacturer of tool steel to employ high frequency electric induction furnaces for its melting processes. In recent years the company has been active in the development of tungsten carbide, and its research in powder metallurgy. The company's sintered carbide materials are sold under the names of "Firthite" and "Firthaloy".

The Wolf Tongue Mining Co. in Boulder, Colorado, was acquired in 1923 and is operated as the Company's mining division. Its Globe Wire division carries on the business of the Globe Wire Company, which was acquired by Firth-Sterling in 1922. The plant and business of the American Carbide Alloys Corporation, which specialized in tungsten-titanium carbides, was purchased in 1939. Branch offices and warehouses are maintained by the company in New York City, Hartford, Philadelphia, Pittsburgh, Cleveland, Dayton, Detroit, Chicago and Los Angeles.

Metallurgists Needed in Government Services

The Civil Service Commission has announced that metallurgists are needed at this time to fill positions in the Bureau of Mines, in Naval Shore Establishments, and in War Department Arsenals. The salaries, including overtime pay, range from $2,433 to $6,228 a year. Most of the positions are at the lower salary levels.

Applicants for the $2,433 positions must have had 3 years of technical experience in the field of metallurgy unless they can substitute appropriate education. The higher-grade positions require additional experience. No written test will be given and there are no age limits.

Interested persons may secure announcements containing full information regarding the positions, and application forms, at the nearest first- or second-class post office or direct from the United States Civil Service Commission, Washington 25, D. C.

Appointments to Federal positions are made in accordance with War Manpower Commission policies and employment stabilization programs.

Business Associations Play Important Postwar Role

In an address before the Industrial Editors' Association of Chicago, Mr. Leverett S. Lyon, chief executive officer of the Chicago Association of Commerce, stated that businessmen's associations will have an increasing responsibility and an increasing opportunity for aiding their members following the war. These opportunities will arise from the fact that governmental factors affecting business will be more important than was the case prior to the war. Although government is interested in almost every business activity, the trend toward increasing government regulation was in progress long before Pearl Harbor, Mr. Lyon said. "Many of the new controls will be relinquished slowly and some may become permanent. As government has played a leading role in organizing the economy for war, it will play a leading role in reorganizing it for whatever conditions the postwar world presents. In these readjustments, primarily through providing informational service to members, will arise an expanding opportunity for association action."

Mr. Lyon further stated, "Progressive associations today have but four fundamental purposes: (1) To promote the interests of the group or area they represent; (2) To provide information for their members; (3) To render direct service to their members; (4) To work toward influencing the environment comprised of laws, regulations, etc., in which business must function."

Bone Tool & Gauge Company Moves to New Quarters

The Bone Tool & Gauge Co. have recently moved from their old plant into new, enlarged quarters at 9910 Freeland Ave., Detroit 27, Mich. These new quarters have increased their manufacturing facilities considerably which will enable them to take on more

HOW TO INCREASE THE Speed OF 2-STEP DRILLING

USE "OIL-HOLE" SUBLAND DRILLS

Oil-hole subland drills make it possible to drill at much higher speeds than with ordinary drills for the simple reason that oil is forced through the shank direct to each cutting edge, keeping the edge always cool.

Add to this the fact that a subland oil-hole drill permits TWO drilling steps in a SINGLE operation, and you will readily appreciate why this advanced type of drill quickly pays for itself in reduced production costs.

Made to specifications — all sizes from ½" to 3½" in diameter and up to 36" overall. Please specify taper or straight shank.

●

DETROIT REAMER & TOOL CO.

2830 E. 7-Mile Road, Detroit 12, Mich.

Manufacturers of

Oil Hole Drills Special Reamers
Circularity Relieved Reamers
and End Mills
Also Special Tools

Straight Shank Subland Oil Hole Drill

Morse Taper Shank Subland Oil Hole Drill

work and to render prompt service. The Bone Tool & Gauge Co. specializes in tools, gages, dies and fixtures, also experimental work. They invite consultation with manufacturers in regard to the design of tools, gages and dies.

Rustless Iron and Steel Signs Union Contract

Two "firsts" were established at the Rustless Iron and Steel Corporation, Baltimore, Md., when the first contract between Rustless and the United Steelworkers of America-CIO and the first 1945 union contract in the steel industry were signed at a ceremony at the Rustless Baltimore Plant.

Mr. C. R. Hook, Jr., Secretary of Rustless, and Mr. Albert Atallah, CIO official, declared in a joint statement: "We are glad to say that during the negotiation of this first Rustless-CIO contract there were no issues left in dispute which had to be taken to the War Labor Board or to arbitration, and signing of this contract represents complete agreement on labor policies between the firm and its employees through their bargaining agent. In signing this two-year contract which runs until February 1, 1947, we have pledged mutual cooperation and understanding between labor and management in maintaining fullest production of stainless steels at Rustless which are vitally needed in the war."

Dr. Van Pelt to Direct Battelle Program of Research Education

Mr. Clyde Williams, Director of the Battelle Institute for Industrial and Scientific Research has announced the addition to their staff of Dr. J. R. Van Pelt, Jr., formerly Technical Director of the Museum of Science and Industry in Chicago. Dr. Van Pelt will head Battelle's program of research education.

The educational program is designed to help America maintain its top flight position in science and will be of special interest to returning veterans who have college degrees and who can qualify for post graduate training in the sciences.

"This program of research education", said Mr. Williams, "is a familiar field for Battelle Memorial Institute. Thousands of veterans are learning that scientific manpower is one of the country's key assets, and that the supply of such men is now and will remain for years critically short. Battelle Memorial Institute, in cooperation with other education institutions, will give a few specially qualified veterans the finest possible training in scientific research.

"America has been so busy in the last five years", Mr. Williams pointed out, "applying the old familiar laws of nature to military purposes that we have had too little time for discovering new scientific laws. Building new post-war industries and products for mass consumption depends on a steady flow of new basic knowledge. Furthermore, this new knowledge is vitally important for national preparedness in the future".

Enemy Patents Available from Alien Property Custodian

An exceptional opportunity for United States citizens to reap the profit from millions of dollars of enemy research is presented through the Office of Alien Property Custodian.

At the outbreak of the war, some 45,000 United States patents and patent applications were seized from enemy aliens and nationals of occupied countries. Licenses under most of these are now available to United States citizens for an administrative fee of $15.00 per patent.

About 30,000 of the seized patents are of German origin. Many of the remaining are Italian and Japanese. They cover practically every field of mechanics, electricity, and chemistry.

For ease in examination, the 45,000 patents have been divided into 312 general groups. These groups include aeronautics, amusement devices, bleaching and dyeing, brakes, carbon compounds, fertilizers, photography, circuit breakers

MULTIPRESS

A 4-TON "POWERHOUSE" IN SPACE-SAVING BENCH SIZE

Basic Unit
$575.00
Patents Applied For

MULTIPRESS is the answer to an amazing range of production needs in one compact, space-saving unit! For example, it gives you:

- *Ram pressures from 300 to 8,000 pounds . . . and you can closely limit them anywhere in that range!*
- *Length of ram stroke easily adjustable from 1/16-inch to six inches!*
- *Ram speeds up to 200 inches per minute downward, and 300 inches per minute upward.*
- *Full "feather-touch" control of ram travel and pressure at all times — plus many other controls.*
- *A completely self-contained, motor-driven, oil-hydraulic machine tool! Easily portable. Delivered ready to connect and operate, after installation of a motor-starter.*
- *Built for a wide range of standard accessories that further broaden the applications of the basic Multipress.*

MULTIPRESS is 16 inches wide, 26 inches deep, and 34 inches high, weighs only 725 pounds, and has a table area of 10½ x 16 inches, which can be increased to 10½ x 32 inches with table extensions.

The ram responds instantly to the slightest movement of the control levers — may be lowered rapidly or slowly, or stopped anywhere in its downward travel while the work is positioned beneath it. Pressures can be increased gradually or applied in full at once. The gauge shows pressures exerted on the ram in both tons and pounds per square inch.

Multipress fixtures are available for efficient high-precision straightening. Matching benches, table extensions, side shelves, a variety of bolster plates, and special ram action controls are also among the standard Multipress accessories. The Denison Engineering Co., 1197 Dublin Road, Columbus, 16, Ohio.

Write for free 12 page Booklet

DENISON
EQUIPMENT for APPLIED
HydrOILics

and conductors, foods and beverages, internal combustion engines, machine elements as well as metal binding, drawing, forging, founding, rolling, working and treatment.

These groups cover also metallurgy, mining and harvesting, optics, plastics, power plants, refrigeration, ships, telephony and telegraphy, textiles, valves, vegetable and meat cutters together with woodworking.

To help businessmen still further the chemical patents and patent applications have been summarized and digested. The complete set of 8,000 chemical abstracts appropriately indexed is available for $25.00 through the Office of Alien Property Custodian, Chicago 3, Illinois.

In the same manner short descriptions and drawings of the 37,000 mechanical and electrical patents are being prepared. The first two of five volumes are ready now. The remaining three will be ready shortly. These two will be available for $25.00 per set through the Office of Alien Property Custodian, Chicago 3, Illinois.

Copies of the actual patents themselves may be seen at the Office of Alien Property Custodian, Field Building, Chicago; 120 Broadway, New York City; 17 Court Street, Boston, Mass.; National Press Building, Washington, D. C.; and Guardian Building, Portland, Oregon.

"You and the Returning Veteran"

One of the major problems facing the country today is the rehabilitation of World War II veterans. The Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has viewed this problem realistically and with the assistance of the Wisconsin Society for Mental Hygiene and, from their own experience in the employing of more than 1000 returned veterans, have prepared a 40-page manual entitled, "You and the Returning Veteran".

This manual is primarily a guide for foremen, for the supervisor is the key man in the successful return of the veteran to his job. The manual was designed to give the foreman additional information and practical suggestions on how to meet such adjustment problems as may arise. The book also contains a listing of the services the company makes available to help foremen direct and assist veterans in making their return to normal civilian life as easy as possible.

The first day back on the job is an event for the returning serviceman and he is treated most cordially by the agencies designated to reestablish him in the organization. His record is analyzed and his job assigned. If special training is needed the program is specifically planned. A Veteran's Counselor makes certain that the veteran is properly reestablished by personal checkup. Allis-Chalmers has found that most veterans are able bodied and well disciplined and cooperative. The worried and nervous veterans need special understanding and their supervisors are instructed in the technique of handling these problems as they may arise.

The foreman has an excellent opportunity to help the worried veteran toward recovery on the job and the Allis-Chalmers' manual instructs him in fundamental principles to guide the worried worker. If the supervisor finds that he cannot cope with the situation he is instructed to call in expert help from the personnel department. The manual cites many case histories of individual veteran problems and the technique used in their solution.

Copies of "You and the Returning Veteran" are available upon request to interested groups and employers. The presentation is an important contribution to the veterans' rehabilitation program.

Westinghouse Newsfront

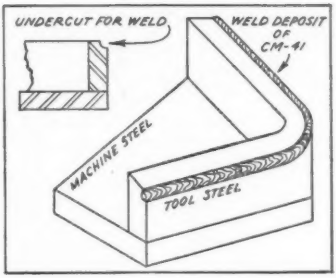
The first issue of Westinghouse NEWSFRONT, a new monthly publication by the Westinghouse Electric and Manufacturing Company, will appear in April.

The four-page report, printed in two colors and illustrated with drawings and photographs, will contain short articles describing the latest achievements by the company in the fields of scientific research, engineering and production. Featured in the first issue are a round-up on

Tools and Dies ON SHORT NOTICE

• NEW OR REBUILT •

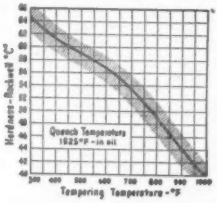
Avoid delays by arc welding with
PHILLIPS CRUCIBLE ARC No. CM-41 Electrode



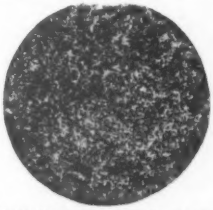
APPLICATION of Phillips Crucible Arc Electrode No. CM-41 to provide a hard edge on a fabricated die is shown in the sketch above. No. CM-41 has a wide hardness range, obtainable by varying the cooling rate—and a low shrinkage characteristic which minimizes warpage and checking. It is the preferred electrode for applications requiring combined hardness, toughness and the ability to retain a sharp cutting edge. Deposits of No. CM-41 will be machinable if the rate of cooling is sufficiently slow. Hardness as deposited will be approximately Rockwell C 60.5 with fairly rapid cooling. Hardness as developed by heat treatment is indicated by the accompanying curve.

Your own tool room can fabricate new tools and dies, or rebuild your old ones, in hours rather than days—and at low cost. Special tooling is quickly accomplished, with large savings of costly and hard-to-get alloy steels. Our manual on arc welding tools and dies is a complete and reliable guide to the selection of materials and procedures for all tool room requirements.

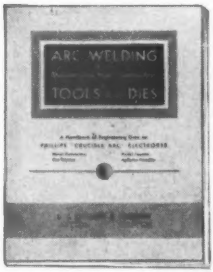
Application Procedure for No. CM-41
Use electrode positive (reverse polarity). In general the proper arc current will be slightly lower than for ordinary steel. Slag should be removed after each deposit, to expose clean metal for the next deposit. When die has been hardened and machinability of deposit is required, piece should be annealed before welding. After welding, piece should be reheated and then cooled in mica or asbestos.



Tempering Curve, No. CM-41



No. CM-41 Deposit after heat treatment (500X)



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MANUFACTURERS AND DISTRIBUTORS OF WELDING ELECTRODES AND SPECIALTIES

the company's annual report to stockholders, a story on a new application of the Precipitron air-cleaner for the removal of fly-ash, and a picture page illustrating recent Westinghouse developments.

Requests to be placed on the mailing list should be addressed to the Editor, Westinghouse NEWSFRONT, Dept. T, 306 Fourth Ave., Box 1017, Pittsburgh, Pa.

"Machine Tool Trading Pit"

The Reconstruction Finance Corporation has announced the establishment of a "machine tool trading pit", devised as a means of promptly redistributing production equipment for use in accelerating the manufacture of munitions in thousands of American plants.

The trading pit, established by the military services and government production agencies, is a central supply point, or pool, into which machine tools and production equipment are reported as they become available for transfer from one type of war production to another. A central Board of Review will determine the allocation of tools and will supervise the trading pit operations. Used machine tools, wherever possible, will be substituted for new tools, thereby reducing the demand on the nation's reservoirs of skilled manpower and critical materials.

All applications—PD 3a (WPB-542)—submitted by the services for new equipment and involving machine tools and production equipment having a unit price of more than $3,000 are screened against this list and where possible used tools are recommended for substitution. The RFC stated that there is every reason to expect that such screening will in the immediate future result in an increased number of used tool substitutions, with a consequent reduction in the placement of new machine tool orders.

Plants handling war contracts are inspected by field representatives of the Army, Navy, U. S. Maritime Commission and the Defense Plant Corporation. These representatives report to DPC all government owned machine tools and production equipment that are temporarily idle and consequently available for other war work. Such equipment is listed, and kept on record in Washington.

It is considered likely after the trading pit plan has served its present objective of speeding war production, that the plan, with modifications, may be adapted for screening and filling the applications of various government agencies for surplus production equipment and may eventually be used to channel tools to peacetime production. Under the Surplus Property Act, government agencies are given priority in applying for certain types of surplus property.

Through March 8th, a total of 4,463 items have been authorized to be sold, transferred or leased to contractors engaged in war work. At the same time, the board denied applications for the sale of 255 items for which war needs had not been sufficiently demonstrated.

Dr. Zay Jeffries Awarded Clamer Medal

The winner of the Clamer Medal of The Franklin Institute has been announced by Dr. Henry Butler Allen, secretary and director of the Institute. Dr. Zay Jeffries, vice president of the General Electric Company, Pittsfield, Mass., was awarded the Clamer Medal at the annual Medal Day ceremonies on April 18th, at the Franklin Institute in Philadelphia for his "meritorious contributions to the science of metals, which he has placed on a new and more intelligible basis." The Francis J. Clamer silver medal is awarded at least once in five years for achievement in the field of metallurgy.

A prolific writer, Dr. Jeffries has published over fifty works on metallic and non-metallic engineering materials. His contributions on the metallography of tungsten, on the theory of hardening and the constitution of steel, the development of the slip interference theory of the hardening of metals, have been regarded as outstanding and original by metallurgists throughout the world.

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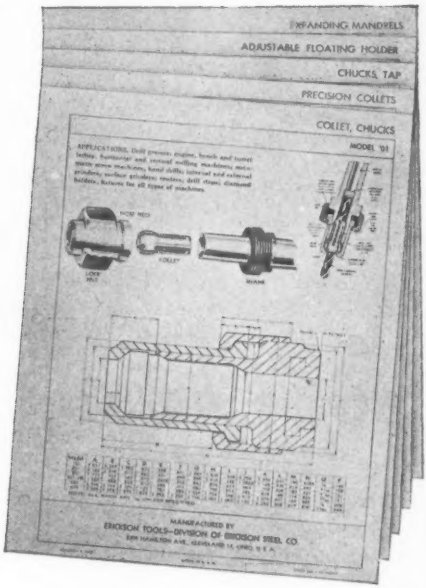

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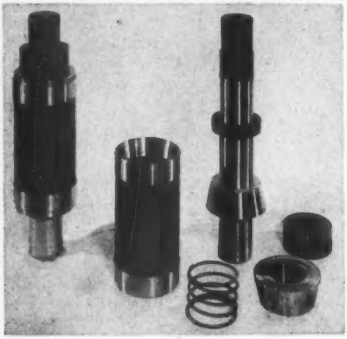

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The expanding arbor shown above is made mostly of tool steel tubing. Previously made of solid carbon steel bar stock, it was expensive and unsatisfactory. Tool steel tubing saved money and made a better arbor. Write for details.

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Forging Die Manufacturers Affiliate With NTDMA

A group of leading drop forging die manufacturers voted at a meeting in Detroit recently to affiliate themselves with the National Tool and Die Manufacturers Association, according to an announcement by George S. Eaton, of Cleveland, Executive Secretary of NTDMA. While a number of these shops have been in the NTDMA for some time, the majority was as yet unaffiliated. A Forging Die Section of the NTDMA is planned to deal with any special activities which these manufacturers want handled. For the most part, however, their problems and interests will be identical with those of the other contract shops producing special tooling equipment, for example: in such matters as government regulations and controls, public relations, selective service deferments, excess profits taxes, repricing, among others. John S. Tincu, of Tincu Forging Die and Tool Company, Chicago, arranged the Detroit meeting and was elected its chairman. He was to represent the group at the Philadelphia NTDMA Board of Directors' meeting in March.

★

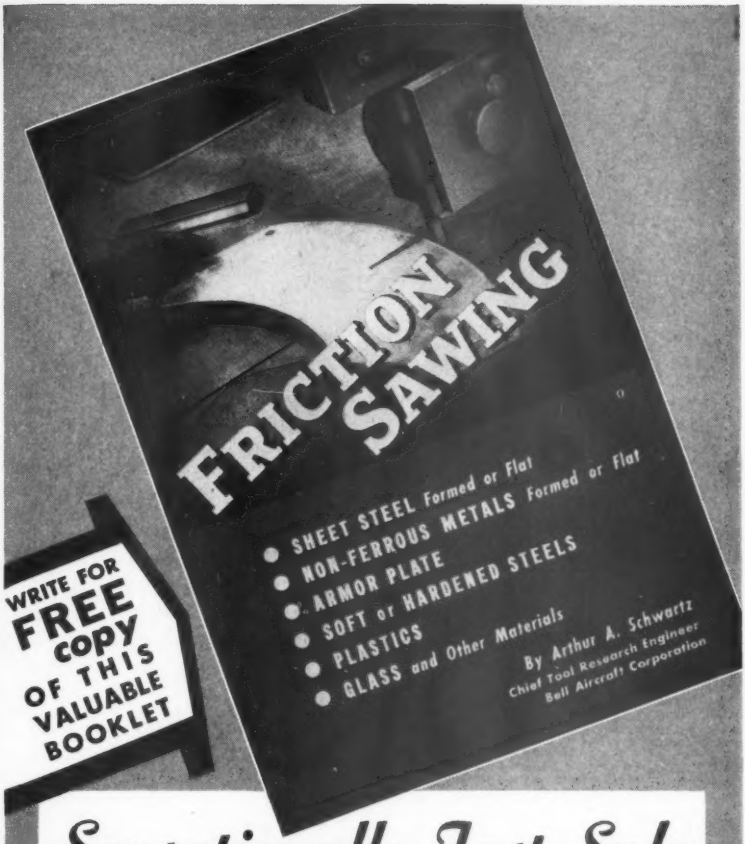
Third white star for Heller Brothers Company! The third white star for continuous outstanding production achievement in completing wartime schedules was added to the Army-Navy Production Award "E" flag of Heller Brothers Company, Newcomerstown, Ohio. Their original Army-Navy "E" pennant was awarded on Sept. 21, 1943, and later the first and second white stars were awarded on Mar. 11 and Sept. 16, 1944.

★

(CONTINUED FROM PAGE 140)

point on the line which is an extension of the spindle axis. Each tooth of the cutter is ground by rotating the spindle of the fixture by means of the handwheel through the desired arc as determined by the position of the stops. As each tooth is ground the table of the grinder is traversed to clear the wheel and the cutter is indexed to the next tooth. Since the face of the wheel is dressed parallel to the table, the teeth can be ground at any position on the face of the wheel, thus avoiding wearing a groove in the face of the wheel.

INFORM-A-GRAM KEY No. C36-X



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this method is rapidly displacing other cutting methods. Learn all about it and the machines that make it possible —

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THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

Model JA

NEW IN DESIGN

The Model JA is new in design both inside and outside. In it are utilized fewer parts, and they are made of Magnesium and Aluminum for extreme featherweight lightness. The alloy steel shaft diameter is unusually large for sustained smooth and true operation. This means still longer wheel life and better grinding. The speed, as before, is governed at 80,000 R.P.M. and there are selected ball bearings, front and rear. The JA Featherweight is a distinct improvement over all models previously produced by Madison-Kipp, the originators of really high speed grinders. ORDER TODAY!

THE SAME LOW PRICE! $29.75 in U.S.A.

Weight 12 Ounces; Length 6¼ In; Chuck Size ⅛ In. Wheel Guard Removed for Better Illustration

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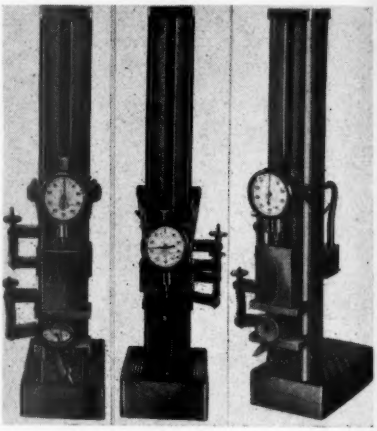
F & H Height Gage

The Inspection Height Gage developed by the F & H Manufacturing Company, Dept. TJ, 10388 Gratiot Avenue, Detroit, Michigan, by utilizing two indicators, has eliminated the bothersome calculations and reference plane measurements necessary in ordinary height gage layout and inspection procedures. Instead of the conventional method of measuring the heights from a surface plane and sub-



tracting, gage blocks are used between the indicators thus permitting direct measurement between critical points. One indicator is mounted on a slider on a vertical column in such a manner as to register the movement of a lower slider which may carry either another indicator for inspection work or a scriber for layout work. Thus measurements between two points may rapidly be made by means of three simple adjustments. The indicators furnished with the instrument read in thousandths of an inch but indicators calibrated in "tenths" may be had for a slight additional charge. The over-all height of instrument is 14½", allowing a total indicator movement of 11". The base is 3" by 5".

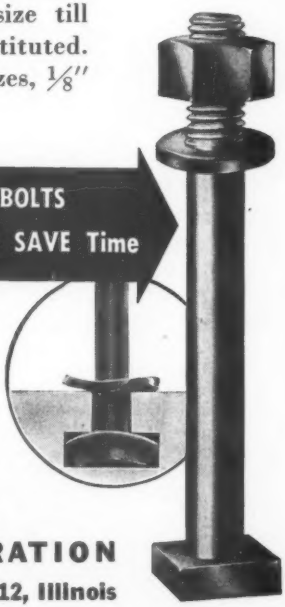
INFORM-A-GRAM KEY No. 286-X

★

Announcement has been received by George F. Wales, president of Wales-Strippit Corp., 345 Payne Ave., N. Tonawanda, N. Y., that the men and women of this corporation have won the Army-Navy Production Award the second time.

COPPER HEAD LAPS
PAY FOR THEMSELVES IN TIME SAVED

Lap holes the economical way . . . use Boyar-Schultz Copper Head Laps. They are fast working; they never wear out. The only wearing part is the inexpensive replaceable copper sleeve which is adjustable to maintain the correct lapping size till worn out and a new one is substituted. Available from stock in standard sizes, 1/8" to 2 1/2".



BOYAR-SCHULTZ SMB MACHINE BOLTS
SAVE the Machine - SAVE the Job - SAVE Time

Worn, distorted Bolts like the one shown in the circle can damage the accuracy of machines, making costly repairs necessary.

Boyar-Schultz SMB Bolts are made from heat treated alloy steel for strength and toughness. Heads are machined square with bodies, presenting a clean, flat surface to the T-Slot. Threads are carefully cut. Close adjustment is possible and work is held firmly under heavy machine cuts. SMB Nuts and Washers are specially made for use with SMB Bolts.

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BARBER-COLMAN MILLING CUTTER DATA BOOK in loose leaf binder style, recently published by the Barber-Colman Co., Machine & Small Tool Div., Dept. TD, Rockford, Ill., is a new service for users of this company's standard and special milling cutters. It is based on performance data taken directly from the field on jobs where specialized engineering has helped in solving certain production problems. This handy binder for removing or inserting pages is intended for key men engaged in ac-

tive production and tooling requiring the use of milling cutters and special tools. It is issued without charge upon receipt of a formal request on company letterhead, and signed by a person in a responsible key position.

ANALYSIS OF DRILL JIG DESIGN, by J. I. Karash, Plant Engineer, Reliance Electric & Engineering Co., is addressed to readers with at least the minimum training and ability necessary to read and make basic drawings. It is presented mainly to suggest a method of reasoning for drill jig design, being built around actual problems, and the result is a basic method, applicable with little adaptation to a wide variety of tool design problems. Tool design is considered as a series of related problems consisting of division of work; machine decision; tool decisions; and justification. The book shows how to gather the information necessary in making these decisions. It shows, step by step, how to make decisions required by the shop and job factors concerning main and secondary operations, locating, positioning, clamping and chip clearance. Besides outlining these procedures in their fundamentals, it deals with specific problems encountered in drill jig design. Some of the twelve main subjects treated are the analysis of drilling operations, principles of locating, clamping, secondary-operation jig features and principles of interchangeability. The author aims to create an orderly and systematic perspective of sound thinking, not as a substitute for but to supplement and interpret shop experience. The book's main objective is to instigate original or analytical thinking. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y., and priced at $3.00.

DICTIONARY OF ENGINEERING AND MACHINE SHOP TERMS, by A. H. Sandy, has been compiled with an intent to help both the beginner and the experienced. In the engineering world many common words and terms have shades of meaning peculiar to the industry. Often a new process brings into customary use a whole new list of words. Average text-book terms in need of clarified meanings will be enhanced in value by the use of this handy reference dictionary. It contains the meanings of many important terms and words used in industry and gathered by the author during his years of industrial experience and lecturing. It is believed no scientific inaccuracies have crept in, although in the interest of clarity, a little license has been taken in some cases. This book's clear and simple language makes it adaptable for use not only by engineers and engineering students but by foremen and specialized workmen. Published by The Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., and priced at $2.45.

PRODUCTION LINE TECHNIQUE, by Richard Muther, Instructor, Dept. of Business and Engineering Administration, Massachusetts Institute of Technology, is directed to plants hitherto operating on a job-lot basis, for whom line production is a relatively new undertaking. These observations result from the author's actual experience on various production

lines, his assisting on technical staffs for line organization and maintenance and as an analyst and observer of many line installations. This book explains production line fundamentals, compares them with job-lot manufacture and shows how production lines are set up and operated. It presents a clear and thorough explanation of line production; a knowledge of worthwhile procedures to follow and of avoidable pitfalls in a production line setup; helpful suggestions for establishment of and operating production lines; and the means of modifying line production to meet situations peculiar to certain plants or demanding considerable flexibility. The book's source of accumulated data has been tested for completeness and clarity in discussions and problem sections with students and operating executives. Objective and penetrative in its scope, this presentation is initially for the express purpose of assisting in the practical application of these procedures to the medium sized plant. Published by The McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y., and priced at $3.50.

MANUAL ON CUTTING OF METALS prepared by the ASME Committee on Metal Cutting Data includes data in a form useful to mechanical engineers, production executives, machine designers or shop mechanics. Its information is sufficiently detailed to make possible the further calculation of data on the use of tool shapes, depths of cut, feeds, etc., which are not in the tables as presented. The data represent the best information available at the publication date (1939) and is of greater value to production executives than information previously available. This volume is comprised of factors influencing the cutting of metals; a series of tables of cutting speeds and horsepower for various cuts on different ferrous materials; equations and constants required for calculating cutting speed, economic tool life, chip pressure and horsepower with instructions for their use. The tables in part two are limited to information on cutting speeds possible with seven shapes of single-nose, 18-4-1 high speed steel tools, cutting a wide variety of commonly used steels and cast irons. Multipliers given in the several tables make possible the calculation of cutting speeds which may be used with other types of high-speed steel, or when it is desired to change the tool life basis. Tables are also included for cutting one grade of cast iron and one of steel with the same seven shapes of tool, made respectively of carbon steel, Stellite J metal and cemented tungsten and tantalum carbide. Within these limits, it is possible to obtain, by simple multiplication and with sufficient precision for ordinary shop practice, data on the relative cutting efficiency of tool materials, relative machinability of the metals cut, the use of cutting fluids, the most economic tool life, and the cutting speed which may be used when cutting a particular ferrous metal at any ordinary depth of cut and feed. Published by The American Society of Mechanical Engineers, New York 18, N. Y., and priced at $5.00.

THE METALLURGY OF DEEP DRAWING AND PRESSING, 2nd Edition, revised, by J. Dudley Jevons, Ph.D., B.Sc., A.I.C., covers the plastic deformation of metals, the examination of sheet in tracing and interpreting causes of failure or of unusual behavior, and the control of annealing and other work processes. Descriptions are extensively given, in step-by-step detail, from components of ferrous and non-ferrous metals through the conversion from melting and annealing to the production stages of deep drawing and pressing. In each production step, great consideration is given to equipment and methods, and the respective advantages or disadvantages. Considerable thorough discussion is devoted to metal composition, specifications for definite uses, crystallization behavior and the resulting defects and procedure difficulties experienced in converting metals to sheet form. Relative to deep drawing and pressing operations, the carefully considered elements are the presses, tools and lubricants, as well as testing. The concluding chapters cover new applications of deep drawing and pressing and desired improvements in metals and machine shop procedure. In both the plastic flow of metals and the craftsmanship of deep drawing and pressing operations, the author presents proved techniques in a thorough and well-balanced manner. Although the writer has had to necessarily assume that his readers have some metallurgical knowledge, the practical worker, unfamiliar with metallurgical terms, can easily follow these discussions with help of the plentiful and clearly illustrative photographs and diagrams that are used in every step of explanation and discussion. This second edition has additions and modifications arrived at since the publication of the first edition. Sections dealing with light alloys and "soft metal" tools have been enlarged. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., and priced at $10.00.

SELF-PRIMING CENTRIFUGAL PUMPS, just issued by Marlow Pumps, Dept. TJ, Ridgewood, N. J., is an interesting and valuable handbook on pumps and covers important pump developments. The treatise sets forth, in easy-to-understand "first reader" style, the principles of centrifugal action, the physics of pumping and the evolution of self-priming centrifugal pumps. The handbook is scientific in content, but ingenious use of illustration and the use of simple, straightforward language make it a work that almost anyone can understand, profit by, and enjoy. In addition, it lends itself to be used as a text and

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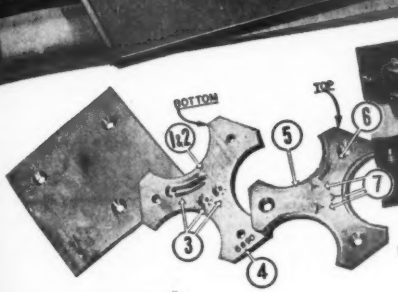

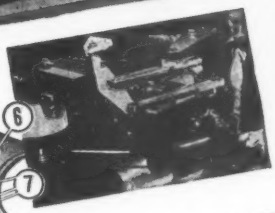

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reference work. Besides giving basic engineering information, the booklet tells the difference between the types of self-priming centrifugals, points out where self-primers can be used with best effect, and details how to install and care for them. The work was completed by A. S. Marlow, Jr., just before he entered the Navy and sums up the results of nearly fifteen years of intimate connection with self-priming centrifugals. It is pointed out by Marlow engineers that developments have been so rapid in this field that up to now it would have been difficult to produce a treatise of this kind, but that basic types of self-primers have become clearly defined during the past few years.
INFORM-A-GRAM KEY No. D45-X

HEAT TREATMENT OF STAINLESS STEELS is a helpful, informative compilation of the Rustless Iron and Steel Corporation metallurgists who through research and long practical experience have worked out correct procedures for various heat treatments of the three basic groups of stainless steels; straight chromium in hardenable and non-hardenable grades, and chromium-nickel in non-hardenable grades. From extreme softness to high hardness obtained by heat-treatment or cold-working, stainless steels are remarkably versatile. To fully develop their valuable properties with equipment, techniques, procedures, with reasons for use of these, is the purpose of this booklet. Besides it contains a data sheet section which is concise instructions for the heat treating of specific grades and groups of stainless steel, with indicated hardness results from various treatments. These Rustless Heat Treating Data Sheets will be found in an envelope inside the booklet's back cover. Duplicates of the complete set or of individual sheets are available by request to the Rustless Iron and Steel Corporation, Dept. TJ, Baltimore 13, Maryland.
INFORM-A-GRAM KEY No. 738-X

"POST-GRADUATE COURSE FOR GEARS" is a 20-page, 3-color, booklet, intended as a possible suggestion source for designers of new products in which right angle reduction gearing is to be used, that has just been made available by Cone-Drive Div., Michigan Tool Co., Dept. TJ, 7171 E. McNichols Road, Detroit 12, Mich. Entitled "Post-Graduate Course for Gears" (Bulletin No. 745), this new publication records some of the current wartime uses of Cone-Drive gearing in order to indicate the type of current and future service for which this gearing has proven itself as ideally adapted. Among the types of services indicated by the analogies in this booklet are: control gears of all types, winches and hoists,

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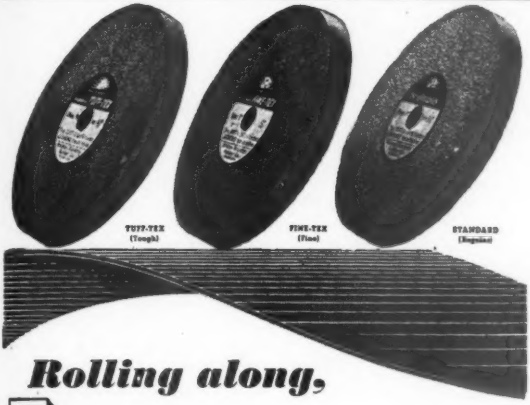

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mining and similar heavy duty machinery, machine tools, presses, separators, stokers, etc. The book bears striking testimony to the spectacular growth in the use of Cone-Drive gearing since the beginning of the war, largely due to its unequaled load carrying ability, longer life, and decreased wear.
INFORM-A-GRAM KEY No. 47-X

WELDERS GUIDE TO SUCCESSFUL HARD FACING is a 31-page booklet recently published by the Mir-O-Col Alloy Co., Dept. TJ, 2416-30 E. 53rd St., Los Angeles 11, Calif. This book is an effort to set forth simply and understandably the result of twenty years of research in, and successful application of, hard facing.

To be successful, hard facing shoud have a high Rockwell and Brinell hardness and must retain its hardness and resistance to abrasion at high red heat. It should have enough toughness to withstand impact, and enough adhesion to form an unbreakable bond with the parent metal, with slight penetration. One of the requisites of a successful hard facing job is the proper technique of application which is quite different from that of welding steel to steel. Among the subjects covered in this welder's manual are the following: Hard Facing, Effect of Heat on Metals, Acetylene Process, Electric Process, Hard Facing Crusher Jaws, Hard Facing Grader Blades and the properties of Mir-O-Col Hard Surfacing Welding Rod, including its hard facing applications by the electric and acetylene processes.
INFORM-A-GRAM KEY No. D16-X

HOW TO CUT WASTE. by Glenn Gardiner, is a 38-page manual that should be a "must" in every foreman's reading. The material contained in this book is based on a series of articles which have appeared in "Management Information," a weekly bulletin for department heads, supervisors, and foremen, edited by Mr. Gardiner and published for many years by the Elliott Service Co., 219 E. 44 St., New York 17, N. Y., who are also the publishers of this booklet.

Not only is the money cost of waste a very important factor but the difficulty of replacing wasted material, supplies, tools and equipment may well be of even greater importance in wartime. The care with which workers avoid waste, excessive wear, and breakdown of equipment depends upon foremen, department heads, and supervisors more than on any other factor.

This manual approaches the subject of waste from several viewpoints such as spotting the causes of waste, including the waste of manpower, the waste of materials and supplies, the waste of machinery and equipment, the waste of work space, wasteful accidents, waste of time, and the waste resulting from non-cooperation. The second part of the booklet discusses methods designed to attack waste inlcluding a four-step plan to cut waste. It shows how the plan works and offers aids in conducting a campaign against waste and in enlisting worker cooperation.
INFORM-A-GRAM KEY No. D15-X

DESIGNING FOR DIE CASTING (1945 EDITION) published by the New Jersey Zinc Co.,

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Centralized controls assure ease of operation - - - - simple, well balanced design for longer care-free duty.
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Dept. TD, 160 Front St., New York 7, N. Y., as an aid to design engineers desiring to fully use the advantages offered by zinc alloy casting, contains much new information assembled in the five-year interval since publication of the first edition. Its purpose is to help users of die castings arrive at the most worthwhile designs for utilizing die casting possibilities and avoid its limitations. Early consideration of a casting's soundness, mechanical properties, surface character and cost as influenced by skill in adapting design to the process of die casting will help users benefit by the inherent economies of die casting. Among the booklet's highly instructive features are tables of selection factors, and composition and properties of zinc, aluminum and magnesium alloys.
INFORM-A-GRAM KEY No. 410-X

GRINDING WHEEL DATA BOOK Supplement (Form ESA-73) and a Standard Marking Folder and Chart (Form ESA-72) are new literature of The Abrasive Co., Dept. TJ, Tacony & Fraley Sts., Philadelphia 37, Pa. The supplement to the data book (Form ESA-52-5) replaces the description of Grinding Wheel Markings, Data Book pages 16 through 18, and also includes a new wheel selection table showing General Recommendations in Standard Markings, to replace the section from p. 19 through 38. This literature combination presents information that is essential to making the selection, buying and using of Abrasive Grinding Wheels easier and more convenient. Copies of any or all of the above forms are supplied free upon request.
INFORM-A-GRAM KEY No. 172-X

DESIGN AND FABRICATION OF METAL PARTS FOR PORCELAIN ENAMELING is a 19-page illustrated booklet containing drawings and tables prepared by the Porcelain Enamel Institute, Dept. TD, Washington 5, D. C. This technical handbook has been prepared as a guide, in the design and fabrication of metal parts to be porcelain enameled, for production men not familiar with the requirements of the porcelain enameling process and also as a summarization of essential basic principles for those within the industry. It is a compilation of practical, shop tested information, by outstanding men recognized as authorities in the various branches of the porcelain enameling industry, including porcelain enamel plants, frit manufacturers and base metal producers. Included in the contents of this booklet are the basic properties of modern porcelain enamel, the selection of materials for porcelain enameling, design factors, fabrication, etc.
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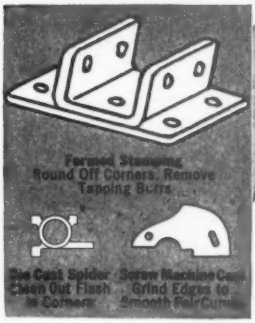

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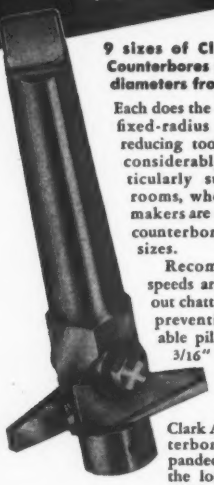

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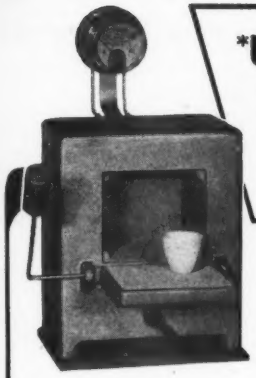

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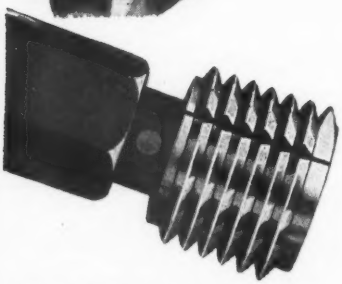

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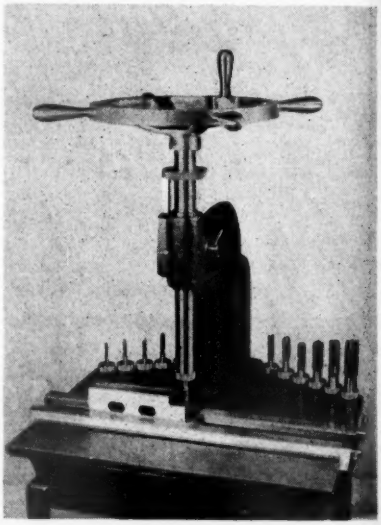
The Lassy Hand Tapper, made by the Lassy Tool Company, Plainville, Connecticut, combines a number of new modifications to the conventional hand tapper which result in greater accuracy, economy, and less tap breakage. The operator may check the tap penetration at any time by means of a sliding graduated scale mounted beside the spindle. An instantly adjustable ring on the spindle bears against the scale, causing it to indicate directly the spindle travel. Freezing or breaking taps in the bottom of blind holes is thus eliminated. On the table are quickly adjustable holding bars which may be brought to bear against the work after it is centered under the spindle, thereby holding the work securely against any twisting or cocking action. Hardened and ground, snap action, tap adaptors are used, permitting quick changes and accurate alignment.



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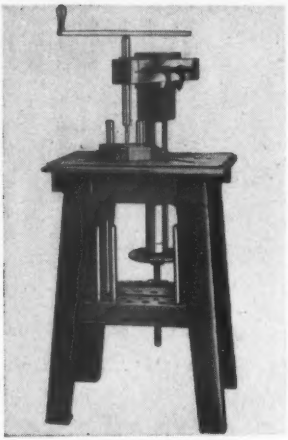
2 Producto Tools



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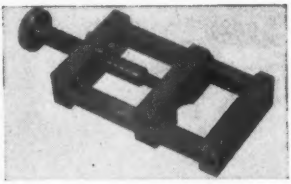
This recently developed machine insures accurately tapped holes and prevents tap breakage. No setting up required. Holes can be tapped or reamed in any position on table, using tap sizes from No. 5 to 1" diameter.



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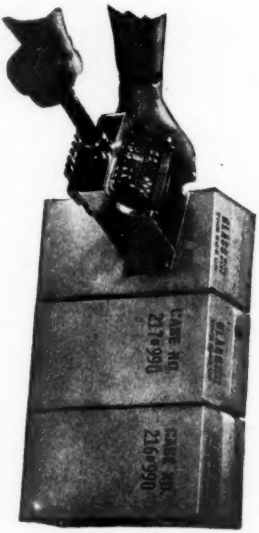
This Automatic Case Numberer, made by Adolph Gottscho, Inc., Dept. TD, 190 Duane St., New York 13, N. Y., has a rubber faced figure for imprinting large, legible figures on rough wooden cases, corrugated cartons and shipping papers. Of the special models, made for many purposes, one assembly now standardized



consists of 7 wheels which imprint 3 digits, the word "OF" and then three more digits. The first group of 3 digits will change consecutively or in duplicate with each impression to show the case number; the last 3 hand set digits remain unchanged to indicate the total number of the lot. Thus, with the machine set for consecutive imprinting, it supplies a running inventory. These numberers are available in the setups for straight serial or lot numbering or the special model outlined above. They are furnished in 3 different character sizes 1", ¾" and ½", and with triplicate or quadruplicate actions instead of consecutive or duplicate actions. They are guaranteed against mechanical defects or workmanship.

INFORM-A-GRAM KEY No. 44-X

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ACCURATE REPEATING

ACCURATE REPEATING of length in bar stock work is assured by the Newton Bar Feed. Rejects are reduced; production stepped up.

Your airline connects to the pressure Regulator which delivers the desired pressure to the far end of the stock tube and actuates the Piston which pushes the stock into the lathe and against the stop under uniform pressure. Thus, length rejections caused by the variations of pressure inherent in mechanical and hand-feeding of stock are eliminated.

Noiseless stock feeding is accomplished by the Newton Bar Feed. The forward end of the Piston, mounted on end-thrust ball-bearings and of inverted cone shape, centers the stock and turns with it, thereby holding it away from the feeder tube.

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Piston rings of carbon-impregnated Neoprene rubber seldom require renewal in order to retain satisfactory air pressure in the feeder tube. Replacement cost is very low.

Stock loading is facilitated by the Newton Bar Feed. It is only necessary for the operator, without turning away from the lathe, to release the tube lock by a turn of the hand knob, swing the tube over on the slide bracket, insert the bar stock, return the tube to position and lock it.

Pressure regulator in full sight of the operator at all times, is quickly adjusted for various stock weights. Only a small amount of line pressure is necessary for stock feed. For example: 4 lbs. pressure feeds ¼" diameter x 8 ft. stock.

Made in 6 sizes to accommodate bar lengths from 6 ft. to 12 ft., the Newton Bar Feed is priced from

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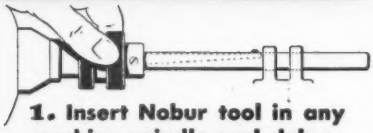
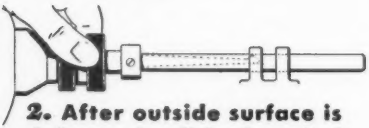
How to deburr holes faster!

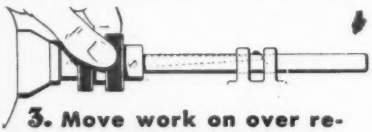


1. Insert Nobur tool in any machine spindle and deburr outside surface of work.

Works like a drill—operator works with complete safety—parts can be burred as fast as they can be handled by operator.



2. After outside surface is deburred, slide knurled sleeve back to retract blade.



3. Move work on over retracted blade and deburr inside surface.

Double-edged cutting blade thus instantly removes burrs around holes in flat or curved surfaces of single or multi-walled parts—smoothly and accurately.

Send for deburring folder. Write

NOTE
All Nobur tools are now furnished with pilot shafts hard chrome plated!

NOBUR MANUFACTURING CO.
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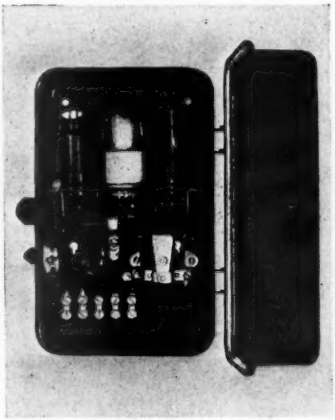
Photoelectric Control

Photoswitch Photoelectric Control, Type A20C, produced by Photoswitch, Inc., Dept. TD, 77 Broadway, Cambridge 42, Massachusetts, automatically controls foundry pouring operations. Previously, molds were poured by a manually operated buggy ladle. By using Photoswitch electric eyes, one operator by remote control pours several ladles at once, eliminating the slowness and hazards of hand pouring. As each group of empty molds moves before a ladle, a Photoswitch photoelectric control, mounted directly



above, "watches" through a viewing tube. When the molds are in place, push button controls actuate the hydraulic mechanism to tip the ladles. In each mold, as the flowing metal reaches the riser, a brilliant light is thrown off, signalling a full mold to the watching eye. Then Photoswitch drops the ladle back to stop the pouring. Besides this, Type A20C indicates and controls gas density and liquid turbidity. It can also distinguish between a liquid and adjacent air or detect an interface between two liquids differing slightly in translucency. Control Type A20C operates on 115 V, AC, 60 cycle, and incorporates a single-pole double-throw relay which will handle 10 amp. AC or 5 amp. DC.

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Lead Screw ground from solid AFTER hardening.

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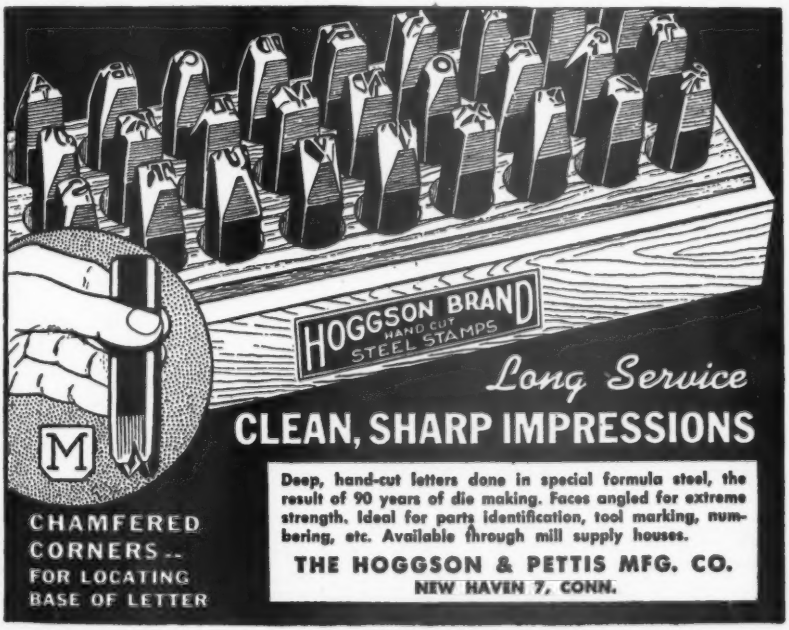

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THE ONLY WRENCH WITH ALL THESE FEATURES . . .

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- Operates in narrow spaces
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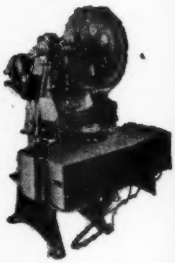
Heyman Semi-Automatic Feeding Machines



The Heyman Semi-Automatic Feeding Machine, manufactured by The Covert Mfg. Co., Dept. TJ, Watervliet, N. Y., combines the advantages of the dial feed and at the same time gives a versatility that the ordinary dial feed does not possess. The machine is made in five sizes, varying from a bench press model to feeding machines for six-hundred ton presses. The essential difference between the two systems of operation is that the indexing table on the Heyman machines is away from the dial and not over it. This distance varies from four inches on a small size machine to as much as eleven inches on large presses. The table is adjustable as to height, thus enabling various types of dies to be used with little or no alteration. To transfer the work from the indexing table to the die, a mechanical hand is used. This hand is made in two forms and is either a straight vacuum pick-up arm or, in the case of complicated shapes, a mechanical jaw which is also actuated by vacuum. It is possible to locate any piece on a die to within a few thousandths of an inch. The mechanism will not pick up a distorted blank and if a piece has been jammed in the die, the arm will not deliver a second piece. In either case, both the feeding machine and the press automatically come to a stop until the jammed piece is removed. There has always been a conflict between safe operation of power presses and the need for increased production. In general, safety guards on secondary operations do reduce production. With the Heyman machine production in most cases can actually be increased, in addition to attaining a large degree of safety. The manufacturers are proud of the fact that up to the present report there has never been a Heyman operator accident.

INFORM-A-GRAM KEY No. D66-X

"HANDIEST MACHINE IN THE SHOP"... That's what users call the versatile Milwaukee DIE FILER

This sturdy, compact, bench-type reciprocal filer is used in Die Shops, Tool Rooms, Machine Shops and Metal Working Plants . . . in the sawing and filing of tools, dies, jigs and fixtures . . . in trimming small parts . . . in lapping operations.

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$125.00 F. O. B. Milwaukee — **COMPLETE with MOTOR and SAW ATTACHMENT**

$118.50 without Saw Overarm. For machines without motor, deduct $8.50 from these prices.

Manufactured by

Milwaukee
CHAPLET & MANUFACTURING CO.
1029 S. 40th ST., MILWAUKEE 4, WIS.

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Design . Construction . Use

Second Edition

By Gordon B. Thayer

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State University extension classes use this book as a basis for instruction because of its "shop-wise" approach to an important new field, and workers in the plastics industry are finding it equally valuable.

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Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

Burke Machine Tool Co.
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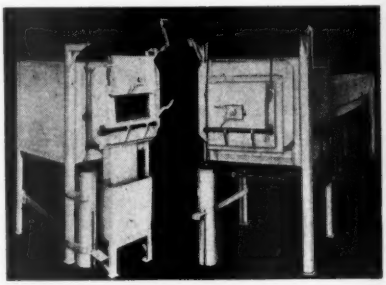
Rockwell Kleenmetal Atmosphere Furnaces

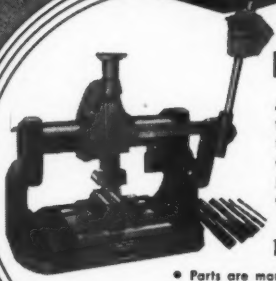
To meet the ever growing demand of tool rooms for experimental and moderate capacity furnaces that provide correct heating with assurance of bright or clean surface finish, the W. S. Rockwell Co., Dept. TD, 50 Church St., New York 7, N. Y., has developed a broad range of "Kleenmetal" oven-type protective atmosphere furnaces. These furnaces have been designed for temperatures between 1200° and 2400° F on such heating operations as bright annealing, silver or copper brazing, tool hardening, high speed steel hardening, scale-free hardening,



non-decarburizing heating or sintering powdered metals. These batch furnaces, substantially lined, insulated and reinforced, are of two types: (1) those with Carborundum or alloy muffles, and (2) those which are heated directly. Muffle furnaces may be gas or oil fired; direct heated furnaces may be gas or electric fired. Both types are supplied with means for introducing prepared atmosphere gas from separate generators or cylinders or for attaining for certain operations the desired atmosphere by controlled combustion of gas in the combustion chamber of the furnace. For hardening and certain other heating operations, the long preheating chamber has a chute leading to a quench tank set in front of the furnace. For bright or clean annealing, brazing, sintering, etc. both muffle and direct heated furnaces are equipped with a water jacketed cooling chamber for cooling the work in the protective atmosphere.

INFORM-A-GRAM KEY No. D67-X

For clear, accurate and fast marking of unhardened steel, brass and other parts, etc.



ACROMARK No. 9A MARKING MACHINES

A stronger, more durable machine for industry, the ACROMARK No 9A model speeds-up production and assembly because it is designed to operate efficiently and dependably . . . with only a minimum of adjustments. Shaft and bearing bar are heavy cold drawn steel, head gibs and adjustable slide and screw are tool steel.

With these features

- Parts are marked with lever stroke in either direction.
- Holders for straight line or roll marking are quickly interchanged.
- Simplicity of operation permits perfect results with unskilled personnel.
- Precision adjustment for any desired marking depth.

Write for literature

THE ACROMARK CO.

5-15 MORRELL STREET, ELIZABETH 4, NEW JERSEY

USE

Fluid-motion

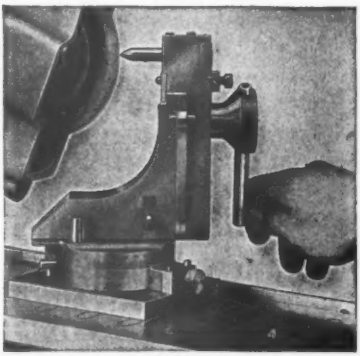
for modern form-dressing

ONE SETTING HANDLE CONTINUOUS MOTION

The J & S Model "E" Radii and Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.

FEATURES

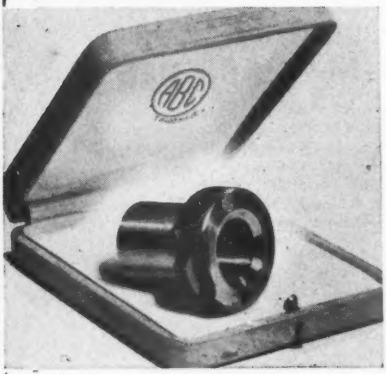
Fluid-motion dressing
.0001″ accuracy
Automatic centering
14″ wheel capacity
Large range yet compact
Chatterless and dustproof



J. & S. TOOL CO.

477 MAIN ST. E. ORANGE 4, N. J.

JEWELS OF PRECISION



A. S. A. STANDARD DRILL JIG

BUSHINGS

Prompt Delivery from Stock

- HEADLESS PRESS FIT
- HEAD PRESS FIT
- FIXED RENEWABLE
- SLIP RENEWABLE
- HEADLESS LINERS

also

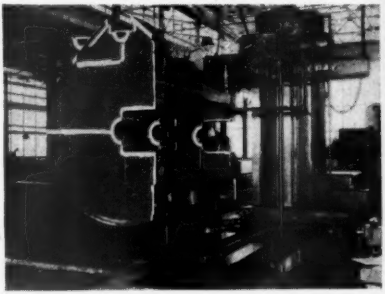
SCREWS • CLAMPS
LOCATING JIGS

Send for New Catalog No. 243

ACCURATE BUSHING COMPANY
447 NORTH AVE., GARWOOD, N. J.

Gray Horizontal Boring, Drilling and Milling Machines

The Gray Horizontal Boring, Drilling and Milling Machine, produced by the G. A. Gray Co., Dept. TD, 3611 Woodburn Ave., Cincinnati 7, Ohio, incorporates rigidity, and simplicity of control for ease and speed of operation. Complete counterbalance of the head minimizes binding of guide ways. All work requirements are met by 24 quick change spin-



dle speeds ranging from 3 rpm to 600 rpm on the 5" bar and from 2½ to 500 rpm on the 6" bar. The speeds are controlled by two range selectors and one lever. The rheostat controlled spindle feed, with only one back gear, has a feed range ratio of 600 to 1 up to 72". The pendant switch has only nine push button controls. The column and head may be precision set to within .00025" by the attached vernier. Rates of speed are changeable while the spindle is moving, and milling feeds from ½ to 30" per min. are provided. There is an automatically disengaged turnstile for rapid traverse of the spindle. On this turnstile, a dial and trip serve to automatically disengage the feed at any predetermined point within 4" of spindle travel. A handwheel with a micrometer collar traverses the spindle slowly and for very accurate setting. Work requiring milling and boring operations in a single setting is accomplished by the use of a patented feature which permits endwise adjustment of the milling cutter when mounted on the spindle drive sleeve. The standard column cross traverse is 24".

INFORM-A-GRAM KEY No. 631-X

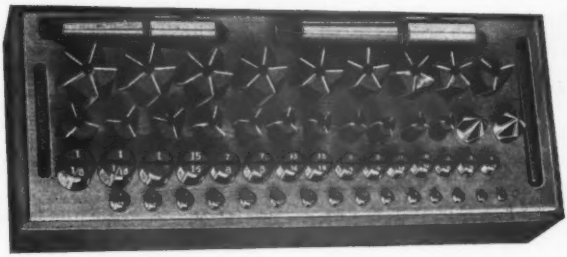
Gairing TOOLS

Counterbore Sets

A kit of these efficient tools eliminates costly delays in counterboring and spotfacing. Seven sets from which to choose. Each contains a logical selection of interchangeable counterbores, pilots and holders. *Write for prices and Bulletin C.*

Set C-13, below, consists of 2 holders, 20 cutters ranging from 9/16" to 1¾" and 28 pilots ranging from 9/32" to 1⅛". Two countersinks, ⅞" x 70° and ⅞" x 82° are included, all neatly boxed with hard wood cover.

THE GAIRING TOOL CO., Detroit 32, Michigan



Rawhide

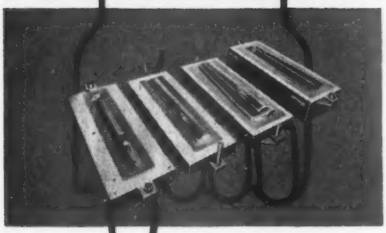
The best "soft" hammers and mallets are rawhide — tough, resilient, long-lasting C/R mechanical rawhide. They strike effective blows without battering or marring . . . without fatiguing re-coil. They hold their true striking surfaces. Sizes and weights for every need. Hammers are malleable iron with replaceable C/R Rawhide insert faces.

Write for Catalog Sheets.

CHICAGO Rawhide MFG. CO.

1100 ELSTON AVE. ★ CHICAGO, ILLINOIS.

STRENES METAL POINTS THE WAY



Here are a couple Strenes case histories that may suggest a way to reconvert to civilian production a little faster.

Tractor Top-Dies

Strenes Metal—cast-to-shape—was specified for stamping tractor hood tops. An accurate cost check showed a saving of around 50% in machining time due to the cast-to-shape construction. On reconversion tooling rush, such a saving will be highly advantageous.

Hydrator Pan Die

Dies of Strenes Metal stand up, too. One refrigerator hydrator pan die, for instance, stamped 2,000,000 parts with a 3½" draw out of .50 material. And, due to the self-lubricating property of the metal, stoning and polishing operations were virtually unnecessary.

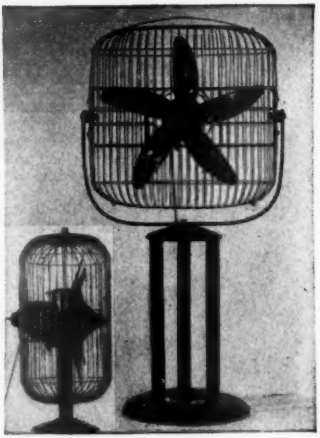
Both for civilian and war products, Strenes Metal has been a definite help on many tooling programs. Facts and figures on request. Write today.

Strenes Metal for drawing and forming dies.

THE ADVANCE FOUNDRY CO.

Dayton 3, Ohio

Strenes METAL



Roto-Beam Fan

The Roto-Beam Unit No. 130, a 24" Safety Circulating Fan distributed by Davis & Murphy, Dept. TJ, 5252 Broadway, Chicago 40, Ill., may be positioned at any angle within 360 degrees, on both its horizontal and vertical axes. It is equipped with an overall safety guard, as illustrated here, and five blades that are operated at either of two speeds by a fractional hp 110 V, 60 cycle motor. Its dimensions including the guard are 30" wide and 18" in depth. A choice of two floor standards provides it with either a 30" or 58" overall height measurement. It is easy to install in any position on a floor, wall, ceiling, pillar, bench, or in ducts for intake or exhaust, or in air radiator heaters, while the approximate area of circulation is 75 by 100. Further information on request.
INFORM-A-GRAM KEY No. D68-X

★

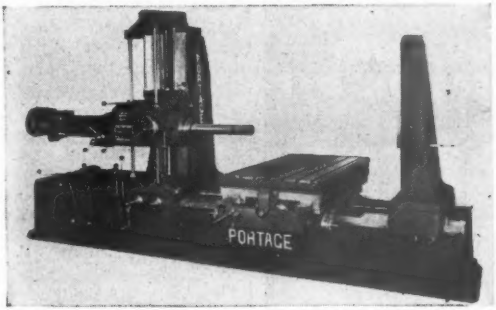
Super Tool Acquires Cal-Cutter Products

Super Tool Company, 21650 Hoover Rd., Detroit 13, Mich., has acquired the Cal-Cutter line of standard and special carbide tipped milling cutters. Cal-Cutter tools, formerly manufactured in Los Angeles, Calif., are now being produced in Detroit and will continue to be marketed by the Cal-Cutter Co., whose offices are also located at 21650 Hoover Rd., Detroit 13, Mich.

PORTAGE

4 INCH BAR HORIZONTAL BORING, DRILLING & MILLING MACHINE

ROTARY TABLES



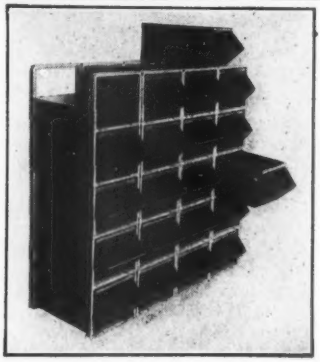
ACCESSORIES

● Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

THE PORTAGE MACHINE COMPANY

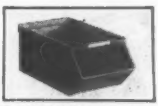
555 Miami Street, Akron 11, Ohio



STACKBINS IN STACKRACKS

REDUCE HANDLING of Tools, Parts and Materials

Because Stackbins are portable containers—not fixtures—tools, parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed—without disturbing any other bin.



STACKBINS are individual hopper-fronted stacking bins, designed for storage, transportation and assembly.

STACKRACKS are individual units which lock together to form storage racks of any size, shape or capacity, into which Stackbins slide like drawers.

Manufactured and sold in Canada exclusively by Walter H. Wickware, Ottawa.

WRITE STACKBIN CORP., 97 TROY ST., PROVIDENCE 1, R. I.

STACKBIN SYSTEM

"Stacked and Still Accessible"

Miccro Supreme

LAY-OUT AND IDENTIFICATION DYE

IN 12 COLORS

Red
Blue
Green
Brown
Black
Purple
Cerise
Yellow
Violet
Tangerine
Chartreuse
Aquamarine

Used for Both

★TOOL, DIE, PATTERN OR TEMPLATE LAYOUT ON METAL.

★QUICK IDENTIFICATION OF BAR STOCK, SHEET OR STRIPS, TOOLS, DIES OR PARTS.

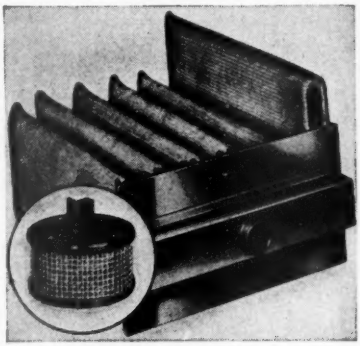
DRIES INSTANTLY
QUICKLY, EASILY REMOVED

Circular giving full information and prices sent upon request.

MICHIGAN CHROME & CHEMICAL COMPANY
6350 E. Jefferson Ave. • Detroit 7, Mich.

Oil and Coolant Strainer

A new attachment for straining cutting oils and coolants and for other installations using flood oiling is the Metex Strainer, made by the Geo. Butler Company, Dept. TJ, 1065 West Washington Blvd., Chicago 7, Ill. Metex strainers are used on grinders, lathes, drilling, broaching, hobbing and boring machines. Typical of the large area Metex strainers, the G-18-6 model illustrated here has a 1944 sq. in. area. In one plant, after the installation of these strainers, machine "down time" and grinder wheel dressings have both been reduced, the latter from five to two per day. Metex strainers need no housing, being installed in the tank, with the oil or coolant piped



directly from strainer to pump. The units of this strainer are a unique combination of wire and cotton, knitted into a mesh to make a strong, non-collapsible strainer unit. Reduction or elimination of final lapping operations is reported by users of Metex strainers which so thoroughly cleanse the coolant. All Metex strainers have large strainage areas; and exceptional capacity to hold dirt, grit and chips can be provided where there is sufficient installation space. The strainer units are quickly and easily replaceable. Metex strainers are available in models rated from two to sixty gallons per minute, for use with all commercial lubricating oils and coolants.

INFORM-A-GRAM KEY No. D69-X

★

The TDJ "Buy With Confidence" directory of products, listing for ready reference the names of manufacturers and dealers, may be found on page 187.

In War, as in Peace . . .

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

REPRESENTATIVES AND DISTRIBUTORS

Brklyn., N. Y., Belmt. Smelt. & Ref. Wks.
Ansonia, Conn., Jackson Associates
Boston, Mass., Jackson Associates
Philadelphia, Pa., Castaloy Metal Sales Co.
Cleveland, Ohio, Die Supply Co.
Detroit, Mich., Castaloy Metal Sales Co.
Chicago, Ill., Sterling Products Co., Inc.
Moline, Ill., Sterling Products Co., Inc.
Milwaukee, Wis., Harry C. Kettleson, Inc.
Minneapolis, Minn., Northern Machinery & Supply Co.
St. Louis, Mo., Metal Goods Corporation
Kansas City, Mo., Metal Goods Corporation
New Orleans, La., Metal Goods Corporation
Dallas, Tex., Metal Goods Corporation
Houston, Tex., Metal Goods Corporation
Tulsa, Okla., Metal Goods Corp.
Los Ang., Cal., Castaloy Metal Sales Co.
Montreal, Can., Dominion Merchants, Ltd.
London, Eng., Min. & Chem. Prod., Ltd.

CERRO DE PASCO COPPER CORPORATION

40 WALL STREET - - - - NEW YORK 5, N. Y.

A Tapping Machine for Fast Changing Times

Is flexible, adaptable, handles a wide range of jobs.

The Procunier unit here illustrated, by interchanging two tapping heads will handle from a No. 2 tap up to a ⅞" tap in steel, ½" in cast iron and ½" in brass and aluminum. That means that in your shops one Procunier can do the work of two or more machines.

In addition, all adjustments can be made quickly and easily—such as regulating compensating spring pressure, setting depth stop, changing to any of the four speeds from 390 to 2050 RPM, or adjusting timing or flow of tap lubricant. Extra long compensating springs assure uniform tapping and reversing pressure independent of operator. Tap establishes its own lead for greater accuracy. Automatic tap lubricator provides abundant supply exactly when needed. Many other features.

PROMPT DELIVERY — SEND FOR BULLETIN giving full details and prices on Procunier Universal Tapping Machines, High Speed Tapping Head and Tru-Grip Tap Holder.

PROCUNIER SAFETY CHUCK COMPANY

12-14 S. Clinton Street **Chicago 6, Illinois**

Procunier Safety Chuck Company
12-14 S. Clinton St., Chicago 6, Ill.

Send me bulletins on: ☐ High Speed Tapping Heads ☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines.

Name .....

Address .....

City ..... State .....

MAIL THIS COUPON TODAY

George Scherr Exhibit and Demonstration Center

The George Scherr Company, manufacturers and distributors of precision measuring instruments, optical inspection tools and gages, has announced the establishment of its machine and precision exhibit at its new location, 200 Lafayette Street, corner of Broome, New York 12, N. Y. Located in the heart of New York's machinery district, the new Scherr exhibit is currently being visited by plant officials from all parts of the country who are interested in the latest developments in precision manufacturing, measuring and inspection. Here, works managers, chief inspectors and superintendents will find the entire Scherr Limited Budget Inspection Laboratory in actual operation. Shop men with measuring and inspection problems are especially invited to view this exhibit. In addition, this exhibit center offers manufacturers and developers of new machines, new processes, new methods and new tools, an unusual opportunity to place their product on the demonstration floor as an introduction to the metal working public.

SPEEDS UP AND SIMPLIFIES SETTING ANY ANGLE FROM 0 TO 90° —USING ONLY A 2" MICROMETER!* IT HOLDS THE WORK! FASTER THAN A SINE BAR OR PROTRACTOR! CONVERTS SET-UP TIME TO PRODUCTION TIME ON SURFACE GRINDERS, JIG BORERS AND MILLERS.

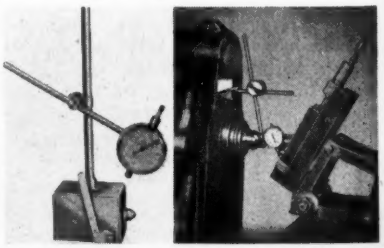
*Also Used With Standard Gage Blocks

NICHOLS-MORRIS CORPORATION
44 CHURCH STREET NEW YORK 7, N.Y.

The Magnetic Indicator Base

Manufactured by Main Electric Co., Inc., the magnetic indicator base eliminates the need of a clamp in holding a dial indicator tightly to iron and steel surfaces. It allows easy access to places impossible to reach with other types of bases. This new magnetic base is composed of two powerful "Alnico" magnets and is claimed to have more than double the strength of other magnetic dial indicator holders, giving it ample strength to support the indicator at the extreme end of the post in any position. The magnetic charge is guaranteed to remain at full strength for five years. Main Electric Co., Inc., Dept. TDJ, 1426 E. Main St., Rochester 2, N. Y., will send additional information on request.

INFORM-A-GRAM KEY No. D43-X



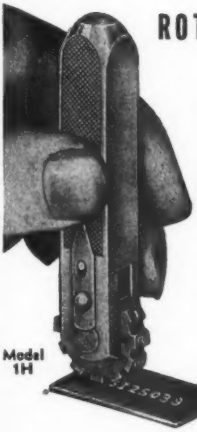
NUMBERALL

MULTI-WHEEL NUMBERING MACHINE MODEL 70

Model 70

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by the machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

Write for Bulletin TD70



Model 1H

ROTARY STAMP

(PATENTED)

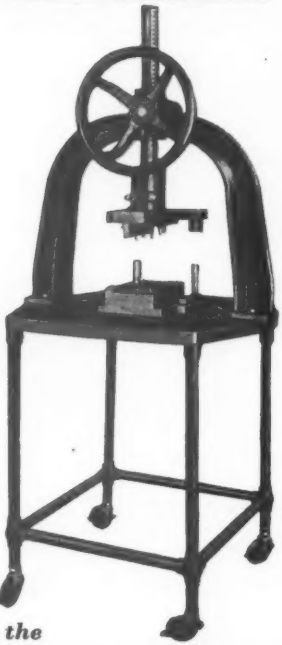
Single wheel, for stamping on brass, aluminum, soft steel, plastic and wood, with a single hammer blow. All figures on 1 wheel, entire alphabet on 2. One stamp replaces 12 individual, hand stamps. Characters from $\frac{1}{16}$" to $\frac{3}{8}$". Also with shank for press.

Bulletin TD1H.

We also make numbering machines . . . automatic and non-automatic . . . for stamping, either hot or cold, numbers and letters into various materials.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

COMPLETE THE DIE-SET AT YOUR BENCH



with the

LACEY DIE-SET MACHINE

Here is a truly "one man" press that operates with one hand and under full manual and visual control.

Handy for tool and press rooms, it permits the diemaker to complete a die-set *right at his bench* . . . saves toolroom and handling costs.

Positive, true punch to-die alignment is assured at all times, thanks to the Lacey's sturdy, open construction. And punches can be removed as often as needed without disturbing alignment once the die-shoe is clamped to the table and punch holder fixed in position in the ram. No pry bar or hammer is needed to separate punches.

The Lacey Die-Set machine is sensitive for delicate work yet rugged enough for fitting up heavy die-sets. Useful, too, for shearing certain types of punches.

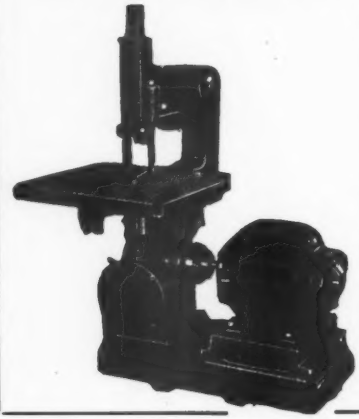
Write today for complete details.

Sole Distributors

MOORE SPECIAL TOOL CO., INC.
740 Union Ave. Bridgeport 7, Conn.

OLIVER

DIE MAKING MACHINES



THE BETTER WAY TO DIE MAKING AND PRODUCTION ECONOMIES

Keep pace with progress. It is quicker and cheaper to saw or file than drill and chip. Postwar tooling and production will demand greater economy, with accuracy. Oliver, the pioneer sawing and filing machine for die and production parts, saves 50 to 60% of direct labor and permits the use of fewer skilled mechanics.

Simplified mechanism, rigid construction and handiness of operation make the Oliver Die Making Machine the busiest tool in the shop.

Send for complete literature today. Excellent Deliveries. Model S-1 illustrated.

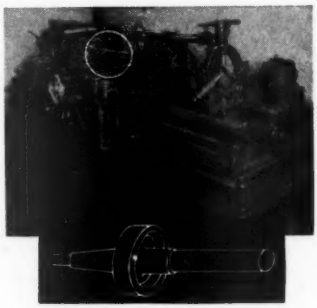
We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders, Point Thinners

OLIVER INSTRUMENT COMPANY

1436 E. Maumee St. Adrian, Michigan

Turchan Time-Saver

A new application of the Turchan Follower Machine, whereby the facing of the curved recess in a 14" diameter aircraft engine drive shaft is performed on a lathe in 1/9 the time formerly required, has recently been announced by the Turchan Follower Machine Co., Dept. TJ, 8259 Livernois, Detroit 4, Michigan. The previous method involved the use of four forming tools, whereas, by the Turchan method of duplicating the curved recess with a simple template, a



single turning tool does the job. The faster feed rate and the elimination of all tool changes make possible present completion of the job in 10 minutes instead of 90 minutes formerly required. Here illustrated, the template guide with the Turchan attachment controls the tool so precisely that the automatic sizing of the recess is insured with only nominal operator attention.

INFORM-A-GRAM KEY No. 104-X

★

THE RIVNUT DATA BOOK, published by the B. F. Goodrich Co., Dept. TD, Akron, O., is of value to all who use or may need these one-piece blind fasteners. This highly informative handbook explains proper rivet selection, correct installation and heading tools as to operation and adjustment. Rivnuts are one-piece, internally threaded and counterbored tubular rivets which can be headed or upset from one side with a simple tool. They are made of aluminum, brass and are now being developed in other metals. They are accurately machined and are ready for immediate use without treatment or conditioning of any kind. Aluminum Rivnuts are anodized for corrosion resistance before shipment. They are the only one-piece blind fasteners which can be used as blind rivets, as nut plates or both at once.

INFORM-A-GRAM KEY No. A4-X

BUY WITH CONFIDENCE

A directory of products, listing for ready reference the names of their manufacturers and dealers. Complete information about any product may be had upon request made to the firm listed or to us.

ABRASIVE PAPER & CLOTH
Carborundum Co., The, Dept. TD, Niagara Falls, N. Y.
Norton Co., Dept. TD, Worcester 6, Mass.
Walls Sales Corp., 97 Warren St., New York, N. Y.

AIRCRAFT PARTS—Precision
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
Sar-Way Industries, Box 117 Harper Sta., Detroit 13, Mich.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.

AIRCRAFT SERVICING & PRODUCTION EQUIPMENT
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.

ALLOYS
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.

ASSEMBLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.

AUTOMATICS—Rotary for Burring, Brushing, Buffing, etc.
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 52, Mich.

BALLS—Carbide
Kennametal, Inc., 500 Lloyd Ave., Latrobe, Pa.

BARS—Boring (See Boring Bars)

BARS—Steel
Latrobe Electric Steel Co., Dept. TD, Latrobe, Pa.

BELTS—Endless
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
Preis Engraving Machine Co., H. P., 159D Summit St., Newark 4, N. J.

BENCH BLOCKS—Duplex
Challenge Machinery Co., The, Dept. TD, Grand Haven, Mich.

BENCH MACHINERY—Precision
Ames Co., B. C., Dept. TD, Waltham, Mass.

BENCH PLATES (See PLATES—Bench)

BENCHES—Work
Challenge Machinery Co., The, Dept. TD, Grand Haven, Mich.

BENDERS
O'Neil-Irwin Mfg. Co., 315 8th Ave., So., Minneapolis 15, Minn.

BITS—Tool (See TOOL BITS)

BLADES—Band Saw (See BLADES—Hack & Band Saw)

BLADES—Cutting Off
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Carborundum Co., The, Dept. TD, Niagara Falls, N. Y.

BLADES—Hack & Band Saw
Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago 39, Ill.

BLANKS—Milling Cutter
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

BLOCKS—V (See V-BLOCKS)

BLOWERS
Gorton Machine Co., George, 1204 Racine St., Racine Wis.
Johnson Gas Appliance Co., 575 E. Ave., N.W., Cedar Rapids, Ia.
Strong, Carlisle & Hammond Co., 1394 W. Third St., Cleveland 13, O.

BOLTS—Eye & T Slot
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Boyar-Schultz Corp., 2112 Walnut Cleveland 3, O.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

BOLTS—Socket Head Stripper
Holo-Krome Screw Corp., The, Dept. TD, Hartford 10, Conn.

BOLTS—Stripper
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.
Holo-Krome Screw Corp., The, Dept. TD, Hartford 10, Conn.

BORING—Attachments
Rusnok Tool Works, 4840 North Ave., Chicago 39, Ill.

BORING BARS
Acme Tool Co., 196 Church St., New York 13, N. Y.
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Enterprise Machine Parts Corp., The, 2735 Jerome Ave., Detroit 12, Mich.
Gairing Tool Co., The, Dept. TJ, Detroit 32, Mich.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

BORING HEADS
Acme Tool Co., 196 Church St., New York 13, N. Y.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

BORING MILL—Horizontal
DeVlieg Machine Co., 450 Fair Ave., Ferndale 20, (Detroit) Mich.

BORING TOOL HOLDERS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.

BORING TOOL PARTS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.

BORING TOOLS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Gairing Tool Co., The, Dept. TJ, Detroit 32, Mich.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.
Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 6, Mich.

BOX TOOLS
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Mich.

BRAKES
Cincinnati Shaper Co., Hopple, Garrard & Elam Sts., Cincinnati, O.
O'Neil-Irwin Mfg. Co., 315 8th Ave., Minneapolis 15, Minn.

BROACH—Holders
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.

BROACH—Pullers
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.

BROACHES
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.

BROACHING FIXTURES
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.

BROACHING MACHINES
Builders Iron Foundry, 23 Codding St., Providence 1, R. I.
Cincinnati Milling Machine Co., The, Dept. TD, Cincinnati 9, O.
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.

BROACHING TOOLS
American Broach & Machine Co., Dept. TD, Ann Arbor, Mich.

BURNERS—Gas & Oil Furnace
Johnson Gas Appliance Co., 575 E. Ave., N.W., Cedar Rapids, Ia.
Strong, Carlisle & Hammond Co., 1394 W. 3rd St., Cleveland 13, O.

BURNISHING TOOLS
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Ill.

BURRING MACHINES
Mead Specialties Co., Dept. H-445, 4114 No. Knox Ave., Chicago 41, Ill.

BURRING TOOLS
Nobur Mfg. Co., 912 No. Orange Drive, Los Angeles 38, Calif.

BURRS—Rotary
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

BUSHINGS—Collet
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

BUSHINGS—Die
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.

BUSHINGS—Drill
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Colonial Bushings, Inc., 145 Jos. Campau St., Detroit, Mich.
Universal Engineering Co., Dept. TD, Frankenmuth, Mich.

CALIPERS
Lufkin Rule Co., Dept. TD, Saginaw, Mich.

CAMS
Hartford Special Machinery Co., The, 281 Homestead Ave., Hartford, Conn.

CARBIDE
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.

CARBIDE TOOLS AND BLANKS
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Kennametal, Inc., 500 Lloyd Ave., Latrobe, Pa.

CARBIDE TOOLS—Sintered
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.

CENTERS
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

CENTERS—Live
Acme Tool Co., 196 Church St., New York 13, N. Y.

CERROBASE (Also see Alloys)
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.

CERROBEND (Also see Alloys)
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.

CERROSAFE (Also see Alloys)
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.
Dies Supply Co., 4751 Hough Ave., Cleveland 3, O.

CHAMFERING MACHINES
Builders Iron Foundry, 23 Codding St., Providence 23, R. I.

CHAMFERING TOOLS
Nobur Mfg. Co., 912 No. Orange Drive, Los Angeles 38, Calif.

CHASERS—Thread
U. S. Machine Tool Mfg. Corp., 100 So. 6th St., Clinton, Ind.

CHECKING DEVICES
Electrix Corp., 156 Middle St., Pawtucket, R. I.

CHESTS—Tool
Scherr Co., Inc., George 200-B Lafayette St., New York 12, N. Y.

CHROMIUM PLATING
Hartford Chrome Corp., 525 Park St., Hartford 6, Conn.

CHUCKS—Collet
Allison Tool & Engineering Co., 4031 Whittier Blvd., Los Angeles 23, Calif.
Erickson Tools, Dept. C, 2309 Hamilton Ave., Cleveland 14, O.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
Hardinge Brothers, Inc., Dept. TD, Elmira, N. Y.
Universal Engineering Co., Dept. TD, Frankenmuth, Mich.

CHUCKS—Drill
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
Lee Co., K. O., Dept. TD, Aberdeen, S. D.

CHUCKS—Lathe
Acme Tool Co., 196 Church St., New York 13, N. Y.

CHUCKS—Magnetic
Acme Tool Co., 196 Church St., New York 13, N. Y.

CHUCKS—Wrenchless
Thomas Hoist Co., 20 So. Hoyne Ave., Chicago 12, Ill.

CLAMPS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Stamping Co., 344 Midland Ave., Detroit 3, Mich.
Gibson Co., The, William D, 1800 Clybourn Ave., Chicago 14, Ill. (Div. of Associated Spring Corp.)
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.
Mead Specialties Co., Dept. HA-445, 4114 No. Knox Ave., Chicago 41, Ill.

CLAMPS—Die
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.

CLAMPS—Toggle
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Detroit Stamping Co., 344 Midland Ave., Detroit 3, Mich.
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.

CLAMPS—Toolmakers Parallel
Lufkin Rule Co., Dept. TD, Saginaw, Mich.

CLINOMETERS
Acme Tool Co., 196 Church St., New York 13, N. Y.

CLIPS
Gibson Co., The, William D., 1800 Clybourn Ave., Chicago 14, Ill. (Div. of Associated Spring Corp.)

COLLET INDEX FIXTURES
Hardinge Brothers, Inc., Dept. TD, Elmira, N. Y.
Zagar Tool, Inc., 23890 Lakeland Blvd., Cleveland 17, O.

COLLETS
Allison Tool & Engineering Co., 4031 Whittier Blvd., Los Angeles 23, Calif.
Erickson Tools Co., Dept. C, 2309 Hamilton Ave., Cleveland 14, O.
General Die-Stamping-Tool Co., (Precision Collet Div.) 262-272 Mott St., New York 12, N. Y.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
Hardinge Brothers, Inc., Dept. TD, Elmira, N. Y.
Rivett Lathe & Grinder, Inc., Dept. TD, Brighton, Boston, Mass.

COMPARATORS
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.
Trico Products Corp., 40 Trico Sq., Buffalo 3, N. Y.

CONTOUR METAL WORKING MACHINES
Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis 4, Minn.

CONTROLS—Air
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

COOLANT SYSTEMS
Gray-Mills Co., 1951 Ridge Ave., Evanston, Ill.

COOLING SYSTEMS—Spot Welder
Gray-Mills Co., 1951 Ridge Ave., Evanston, Ill.

CORE BITS
Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 6, Mich.

COUNTERBORES
Acme Tool Co., 196 Church St., New York 13, N. Y.
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
National Twist Drill & Tool Co., Dept. TD, Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix Ave, Detroit 7, Mich.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

COUNTERBORES—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

COUNTERSINKS
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Severance Tool Industries, Inc., Dept. TD, Saginaw, Mich.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

CRANES
Cullen-Friestedt Co., 1316 So. Kilbourn Ave., Chicago 23, Ill.

CUT-OFF MACHINES
Challenge Machinery Co., The, Dept. TD, Grand Haven, Mich.
Delta Mfg. Co., 612-A E. Vienna Ave., Milwaukee 1, Wis.

CUTTERS—Boring
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.

CUTTERS—Deburring
Severance Tool Industries, Inc., Dept. TD, Saginaw, Mich.

CUTTERS—Diamond Glass (See DIAMOND GLASS CUTTERS)

CUTTERS—Die Sinking
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

CUTTERS—Engraving
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
Preis Engraving Co., H. P., 159-D Summitt St., Newark 4, N. J.

CUTTERS—Fly
Clark Co., Robert H., 9330 Santa Monica Blvd., Beverly Hills, Calif.

CUTTERS—Hard Carbide
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Gorton Machine Co., George, 1204 Racine St., Racine, Wis.
National Twist Drill & Tool Co., Dept. TD, Detroit, Mich.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
Putnam Tool Co., 2985 Charlevoix Ave., Detroit 7, Mich.
Severance Tool Industries, Inc., Dept. TD, Saginaw, Mich.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

CUTTERS—Thread Milling
Pipe Machinery Co., 930 E. 70th St., Cleveland, O.
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Sossner Tap & Tool Co., 161 Grand St., New York 13, N. Y.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

CUTTING TOOLS—Cemented Carbide
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

CUTTING TOOLS—Special
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.
National Twist Drill & Tool Co., Dept. TD, Detroit, Mich.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

CYLINDERS—Air
Mead Specialties Co., Dept. HA-445, 4114 No. Knox Ave., Chicago 41, Ill.
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

CYLINDERS—Hydraulic
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

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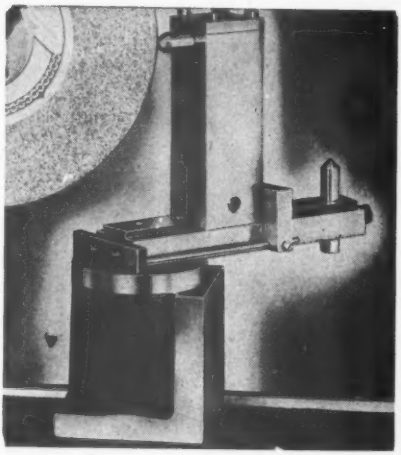

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Alofs Mfg. Co., 1619 Madison Ave., S. E. Grand Rapids, Mich.

DESIGNING AND DRAFTING
Buneil Machine & Tool Co., 1601 E. 23rd St., Cleveland 14, O.

DESIGNING & ENGINEERING
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.

DIALS—Etched Plastic
Eastern Etching & Mfg. Co., Dept. TD, Chicopee, Mass.

DIAMOND BORING TOOLS—(See BORING TOOLS—Diamond)

DIAMONDS—Industrial
Meyers Co., Inc., W. F., 1016 14th St., Bedford, Ind.

DIAMOND HONES
Carborundum Co., Dept. TD, Niagara Falls, N. Y.

DIAMOND TOOLS
Diamond Tool Co., Not Inc., 938 E 41st St., Chicago 15, Ill.
Koebel Diamond Tool Co., 9444 Grinnell Ave., Detroit 13, Mich.
Smit & Sons, Inc., J. K., 157 Chambers St., New York, N. Y.
Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 6, Mich.

DIE CASTING MACHINES
Lester-Phoenix, Inc., 2625 Church Ave., Cleveland 13, O.

DIE CENTERS—Hard Carbide
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.

DIE FILING MACHINE
Illinois Tool Works, 2501 No. Keeler Ave., Chicago, Ill.
Oliver Instrument Co., 1436 E. Maumee St. Adrian, Mich.

DIE HANDLING TRUCKS
Hamilton Tool Co., The, Ninth & Hanover St., Hamilton, O.

DIE MAKERS' SUPPLIES
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.
Producto Machine Co., The, Dept. TD, Bridgeport 1, Conn.
Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis 4, Minn.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.

DIE SECTIONS—Composite Steel
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.

DIE SETS
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Producto Machine Co., The, 990 Housatonic Ave., Bridgeport 1, Conn.

DIE STEEL (See STEEL—Tool & Die)

DIE STOPS—Automatic
West, R. C., 117 Fowler Ave., Kenmore, N. Y.

DIE SUBSTITUTE MACHINES
O'Neil-Irwin Mfg. Co., 315 8th Ave., So. Minneapolis 15, Minn.

DIES
Alofs Mfg. Co., 1619 Madison Ave., S. E. Grand Rapids, Mich.
Barth Stamping & Machine Works, W. 34th & Denison, Cleveland, O.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.
National Machine Tool Co., 1536 Clark St., Racine, Wis.
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Whistler & Sons, Inc., S. B., 752-756 Military Rd., Buffalo, N. Y.

DIES—Bolt
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DIES—Carbide
Firth-Sterling Steel Co., McKeesport, Pa.

DIES—Die Casting
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.

DIES—Master Washer
Hovis Screwlock Co., 8100 E. Nine Mile Rd., Van Dyke, Mich.

DIES—Pipe
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DIES—Plastic Molding
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.

DIES—Punch Press
Federal Tool Corp., 412 No. Leavitt St., Chicago 12, Ill.

DIES—Punching & Notching
Whistler & Sons, Inc., S. B., 752-756 Military Rd., Buffalo, N. Y.

DIES & STOCK SETS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DIES—Threading
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DISCS—Abrasive
Besley & Co., Charles H., 118-121 No. Clinton St., Chicago 6, Ill.

DIVIDERS
Lufkin Rule Co., Saginaw, Mich.
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

DOGS—Lathe & Milling Machine
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DOWEL PINS
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
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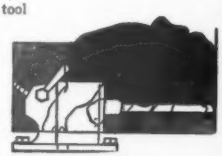

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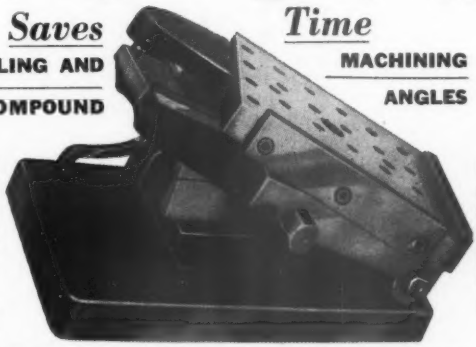

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DRESSERS—Diamond
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Meyers Co., Inc., W. F., 1012 14th St., Bedford, Ind.

DRESSERS—Radius
J & S Tool Co., 477 Main St., East Orange 4, N. J.
Scherr Co., Inc., George, 128-B Lafayette St. New York 12, N. Y.

DRESSERS—Wheel
Lee Co., K. O. Aberdeen, S. D.

DRESSING STICKS
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.

DRILL DRIFTS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DRILL JIG BUSHINGS
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Colonial Bushings, Inc., 145 Jos. Campau St., Detroit, Mich.

DRILL POINTERS
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

DRILL PRESS (See PRESSES—Drill)

DRILL ROD
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Latrobe Electric Steel Co., Latrobe, Pa.

DRILLING ATTACHMENTS
Rusnok Tool Works, 4840 North Ave., Chicago 39, Ill.

DRILLING HEADS—Adjustable
Linderme Machine & Tool Co., Inc., 12550 Coyle Ave., Detroit 27, Mich.

DRILLING MACHINES
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.

DRILLING POSTS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DRILLING & REAMING MACHINES—Deep Hole
Builders Iron Foundry, 23 Codding St., Providence 1, R. I.

DRILLS—Core
Ex-Cell-O Corp., 1200 Oakman Ave., Detroit 6, Mich.

DRILLS—Hardsteel
Black Drill Co., 1400 E. 222 St., Cleveland 17, O. (Div. Black Industries)
Die Supply Co., 4751 Hough Ave., Cleveland, O.

DRILLS—Oil Hole
Detroit Reamer & Tool Co., 2830 7 Mile Rd., Detroit 12, Mich.

DRILLS—Ratchet
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DRILLS—Sensitive
Production Machine Co., Dept. TJ, Greenfield, Mass.

DRILLS—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

DRILLS—Twist
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush Ave., Detroit, Mich.

DRIVES—Gearshift
Lima Electric Motor Co., The, 804 Findlay Rd., Lima, O.

DUPLICATOR MACHINES
Gorton Machine Co., George, 1201 Racine St., Racine, Wis.
O'Neil-Irwin Mfg. Co., 315 8th Ave., Minneapolis 15, Minn.

DUST COLLECTORS
Acme Tool Co., 196 Church St., New York 13, N. Y.

EDGES—Straight
Acme Tool Co., 196 Church St., New York 13, N. Y.
Challenge Machinery Co., The, Grand Haven, Mich.
Ford Motor Co., Johansson Div., Dearborn, Mich.

ELEVATORS—Portable
Economy Engineering Co., 2659 W. Van Buren St., Chicago 12, Ill.

END MILLS
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Gorton Machine Co., George, 1201 Racine St., Racine, Wis.
Putnam Tool Co., 2985 Charlevoix Ave., Detroit 7, Mich.
U. S. Machine Tool Mfg. Corp., 100 So. 6th St., Clinton, Ind.
Wesson Products Co., Dept. TD-4, Ferndale, Mich.

END MILLS—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

ENGINEERING SERVICE
Erickson Steel Co., 2309 Hamilton Ave., Cleveland 14, O.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.

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Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

ETCHERS—Acid, Pantographic
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

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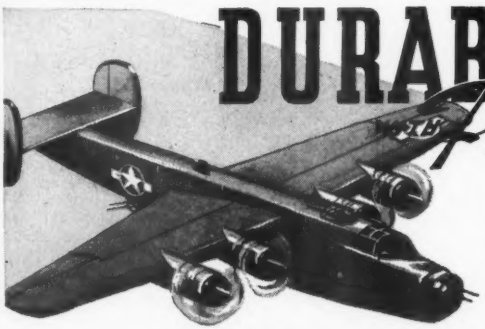

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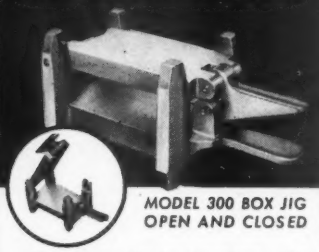

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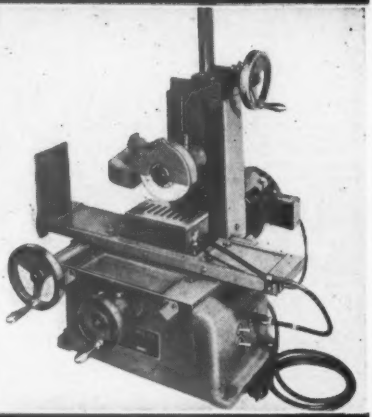

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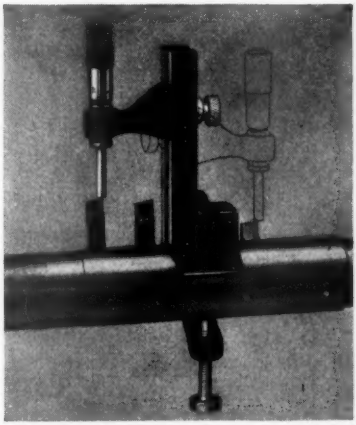

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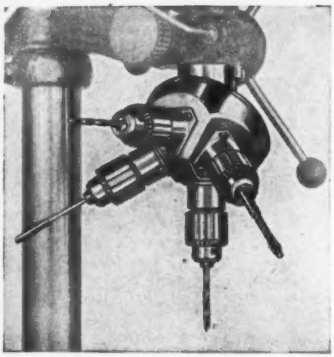

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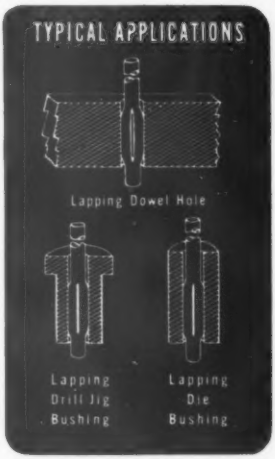

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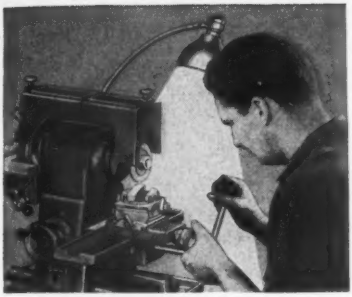

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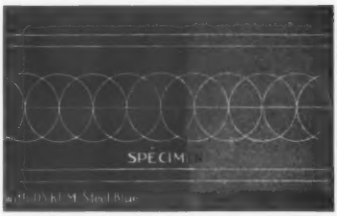

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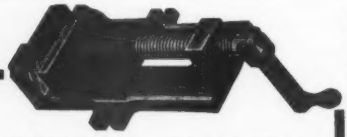

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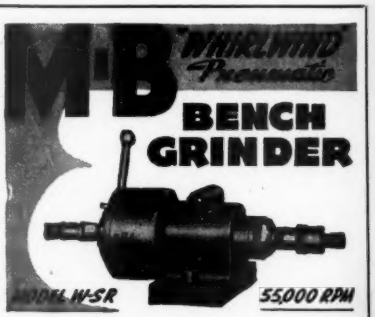

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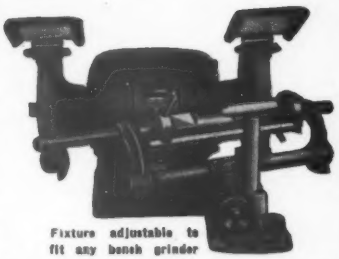

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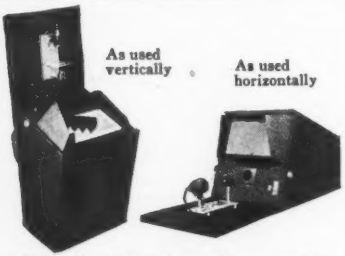

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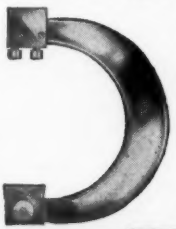

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Challenge Machinery Co., The, Grand Haven, Mich.
Delta Mfg. Co., The, 612-C E. Vienna Ave., Milwaukee 1, Wis.
Smith Tool & Engineering Co., 858 No. Sandusky Ave., Bucyrus, O.

PLATES—Surface, Glass (See SURFACE PLATES, Glass)

PLUGS—Hollow & Socket Pipe
Die Supply Co., 4751 Hough Ave., Cleveland, O.
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POINT THINNER
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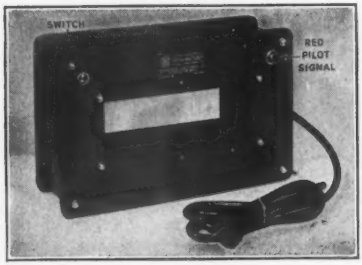
A Tool Room Necessity



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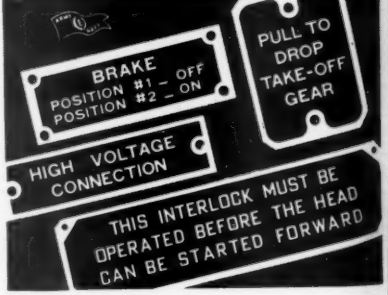
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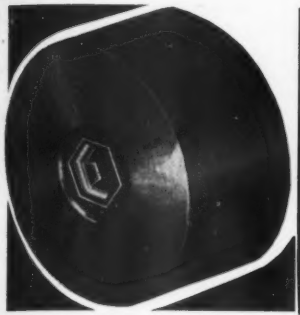

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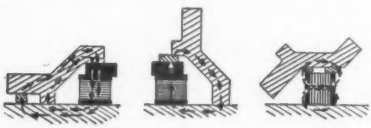

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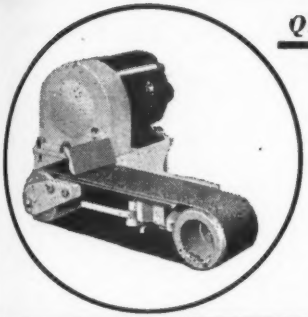

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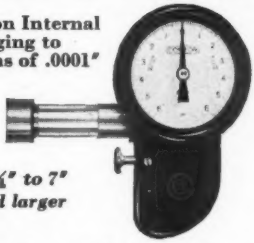

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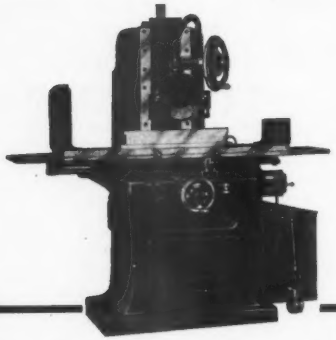

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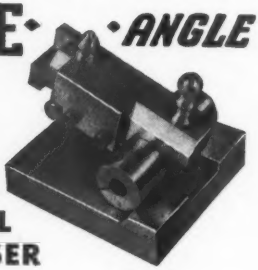

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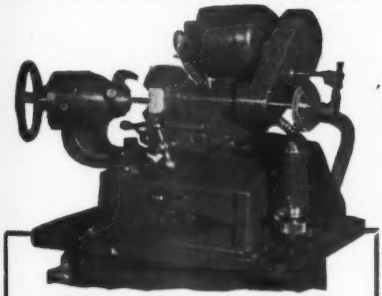

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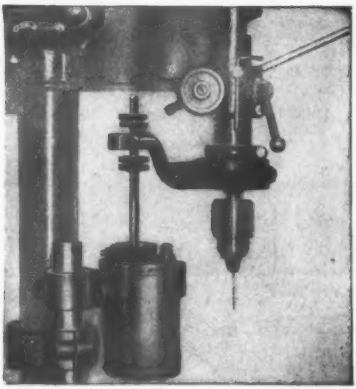

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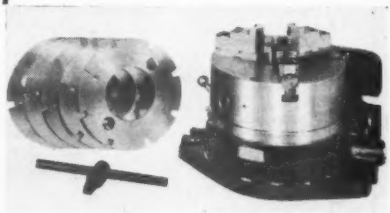

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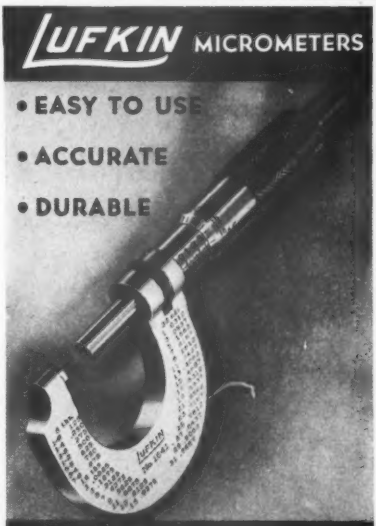

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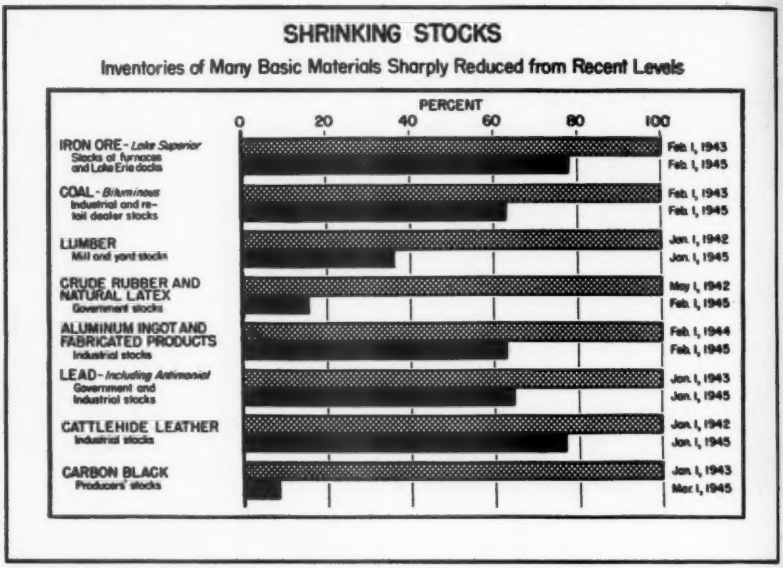

GIBSON SPRING DATA BOOK—a comprehensive manual published recently by William D. Gibson Co., Dept. DJ, 1800 Clybourn Ave., Chicago 14, Illinois, will be of interest and use to engineers and designers.

This book contains essential data and fundamental information about compression, extension and torsion springs, requirements for their design and numerous charts, tables and formulas. A procedure is also given for the calculation of springs. Some of this material has never been published before in this form.

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(Solution to TDJ's March Crossword, Page 144)

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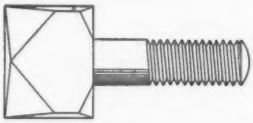
12 A	M	E	S	■	13 S	U	N	■	14 L	E	E
15 M	A	T	■	16 D	A	N	L	Y	■	17 D	A
18 M	R	■	19 M	I	M	E	O	■	20 B	■	D
O	■	21 B	Y	■	■	22 L	A	23 B	O	R	■
24 N	E	O	■	25 M	26 O	L	D	E	R	■	27 B
D	■	28 R	O	A	N	■	■	■	29 E	L	I
■	30 L	E	A	R	■	■	31 O	32 E	R	■	S
33 B	U	R	■	34 N	35 O	36 B	U	R	■	37 A	S
■	C	■	38 S	E	V	E	R	A	N	C	E
39 L	I	40 M	A	■	E	R	■	S	■	41 I	T
42 H	A	R	D	I	N	G	E	■	43 O	D	T



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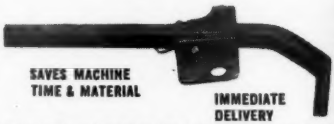

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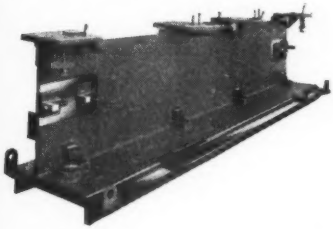

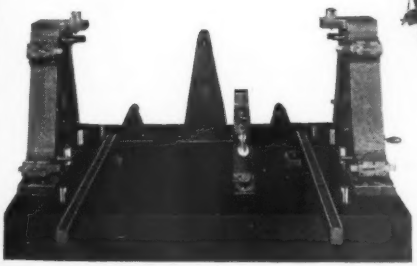

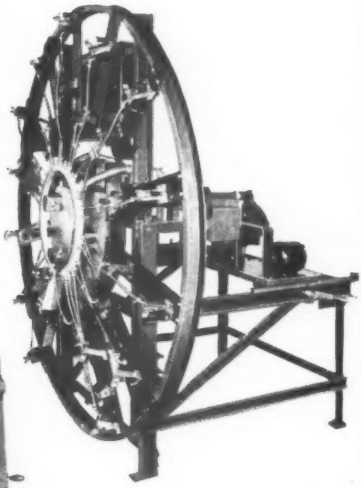

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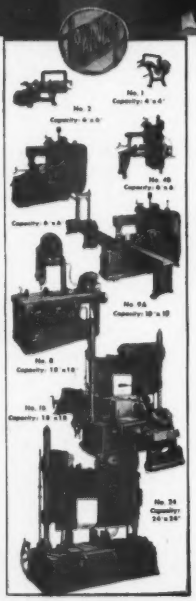

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